Electrical Review

WITH WHICH IS CONSOLIDATED WESTERN ELECTRICIAN AND ELECTROCRAFT.

VOL. 74—No. 5. CHICAGO, SATURDAY, FEBRUARY 1, 1919. PAGE 167.

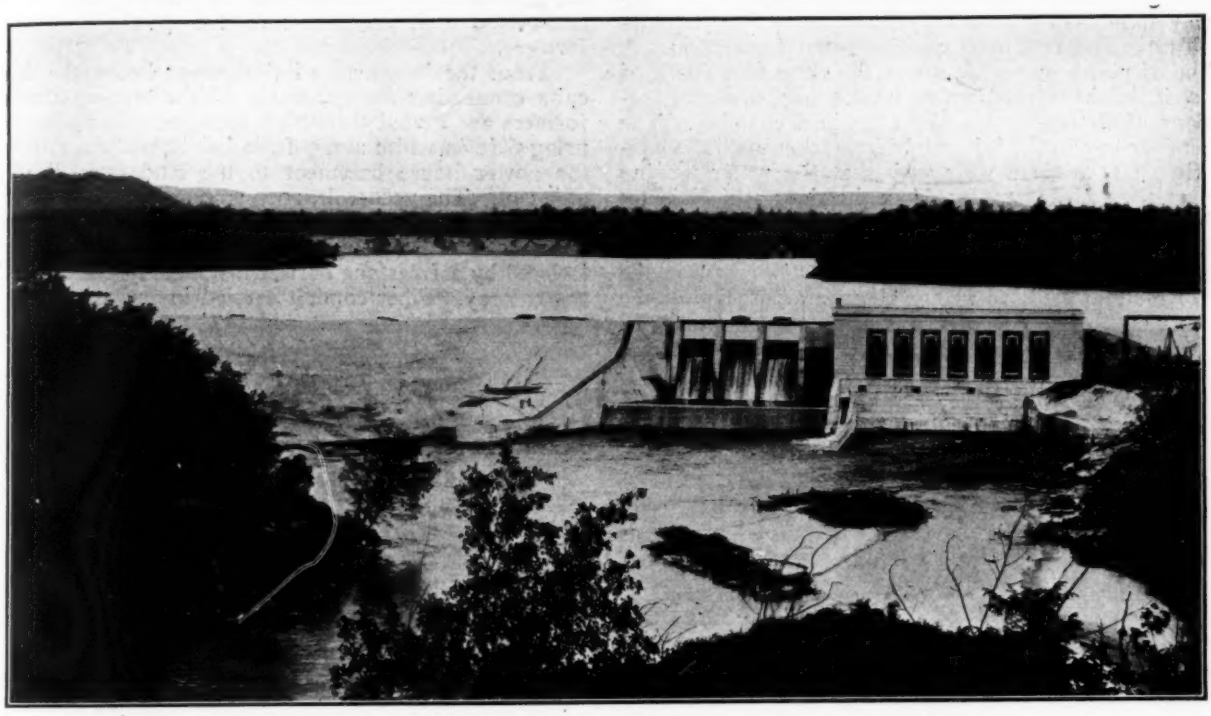


Fig. 1.—General View of Junction Development, Consumers' Power Company.

Simplicity Marks Michigan's Largest Hydroelectric Development

Simplicity of Lay-out, Co-ordination of Turbines Installed to Water Flow and 140,000-Volt Transmission Line, Mark Development at Junction Dam

ON the Manistee River, about 3.5 miles from Wellston, Mich., and where the South Branch joins the Manistee River, is situated the latest addition to the many hydroelectric power plants operated by the Consumers' Power Co., known as the Junction Development. This plant has the distinction not only of being the largest hydroelectric plant operated by this company but also of being the largest hydroelectric development in the State of Michigan. Other distinctive features are that the frequency is 30 cycles and the outgoing voltage 140,000 volts. The plant is rated at 16,500 kw., developed by three 3-phase 5500 kw. 7500-volt generators, and utilizes the full water flow at its location. This plant ties in with Grand Rapids over a 140,000-volt 3-phase line 101 miles in length.

The watershed above this development embraces some 1451 sq. m. Junction Pond, immediately above the dam, and from which water is directly obtained, has an area of approximately 2000 acres. With a 47-ft. working head, and full load, the turbines take 1700 cu. ft. of water each per second.

There are four spillway gates, installed between concrete piers, each a motor-operated steel Tainter gate measuring 13 by 24 ft. To prevent delay in opening one spillway gate, even in the coldest weather, one Tainter gate is steam heated. This is accomplished by supporting steam radiators on the upper radial struts of the gate, which are in turn connected by 2-in. flexible steam hose, to the low-pressure steam-heating system in the power house. Only one of the three spillway gates is thus heated, dependence being placed upon the flow of water through this one spillway to melt ice round the remaining gates.

Each of the three waterwheel chambers is controlled by a Tainter gate 22 ft. in height and 30 ft. in width. (See right-hand illustration in Fig. 2.) These gates are also motor-operated from the switchboard

through worm gear. Telltale lights on the switchboard indicate the position of the gates.

The power house measures 145.5 ft. in length and 40 ft. in width. The spillway is an extension of the power house, made on the river side, and contains the four spillways. The power house and spillway were constructed in the existing channel cut by the river, which was diverted during their construction. The power house is built of brick with supporting steel structure resting on concrete foundations. The spillway and dam are of concrete, the latter of the hollow-fill type, and rest upon clay hard-pan foundation. A line of piling was sunk across the river to a depth of 40 ft. below normal water level. Fig. 2 shows sections of the spillway and waterwheel chamber. The tumbler bay in the left-hand illustration in Fig. 2 constitutes a concrete weir such that the water flowing over the spillway passes down the river at sufficiently low velocity so as not to disturb the river bed beyond the concrete apron in the river bed. The concrete apron extends far enough along the river bed on the down-stream side to assure absence of erosion at the dam.

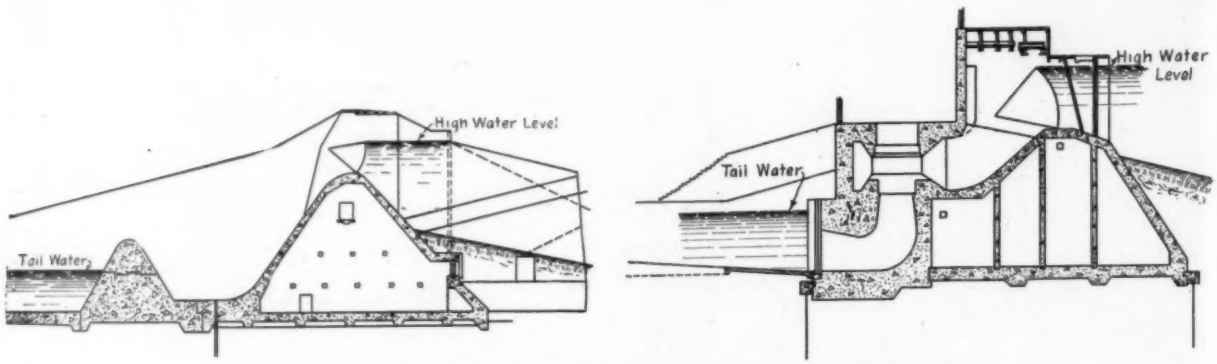


Fig. 2.—Section of Dam Through Spillway and Waterwheel Chamber Respectively.

The three turbines are of the vertical, single-runner type. Each unit has a 99-in. runner and a rating of 7500 hp. at 50-ft. head and 75 r.p.m. A Kingsbury thrust bearing supports the rotating element of turbine runner, generator field and exciter armature. Each turbine is governed by a governor of the oil-pressure type having a capacity of 60,000 ft.-lb. Oil pressure is maintained by either of two pumps, one of which is capable of handling the oil for all three governors. The turbines were chosen so that one unit of 7500 hp. under 47-ft. head will be able to utilize the entire flow of the river at low water. All three units are able to utilize the ordinary river flow, excess being discharged over the spillway.

The electrical lay-out is extremely simple. At the shore side of the power house, and on the same level as the generator floor is located the switchboard, at the rear of which and in a separate room is the generator bus, generator circuit breakers, each in its cell. In a room above is the distribution bus and circuit oil switches, generator field rheostats, etc.

There are three generators, each rated at 6250 kv-a. or 5500 kw., at 80% power-factor 3-phase, 7500 volts, 30 cycles and 75 r.p.m. Each generator obtains its excitation from a direct-connected compound-wound, commutating-pole, 250-volt, 55-kw. generator on the shaft above the generator (Fig. 3).

The generator conductors, of 500,000-cir-mil., lead-covered cable, pass through wrought-iron conduit to their respective circuit breakers. The generator circuit breakers are rated at 7500 volts, 600 amperes and are solenoid operated. From the generator circuit breakers the conductors pass through a wall to the current transformers mounted horizontally above the generator bus, thence through the respective disconnect switches to a single generator bus. This bus is carried by porcelain insulators, the conductor of each phase being separated by a freestone barrier. Immediately above the generator bus chamber, and in the same relative location are the feeders, their disconnects, circuit breakers and the potential transformers.

From the basement of the power house the circuits connecting the generator to the step-up transformers are routed through a concrete subway measuring 6 ft. in width and 9 ft. in height that runs from the power house basement to the land immediately adjacent. The 7500-volt, 2000-ampere cables connecting up the transformers through 7500-volt disconnect switches are carried upon insulators, each phase being isolated by a freestone barrier installed on one side of the subway. Fiber conduit carried in racks is routed along the opposite side of the subway, for circuits other than those going to the main 7500/140,000-volt transformers.

Features of Outdoor 140,000-Volt Substation.

The outdoor substation, situated on the land, and somewhat on the down-stream side of the turbine room is on the same level as the generator floor (Fig. 4). Three single-phase, oil-insulated, water-cooled transformers are here installed, each upon a transfer truck carried upon a concrete foundation, and so arranged with trackage that any unit may be readily moved out of position and transported into the power house without disturbing any of the remaining units. To facilitate repairs necessitating removal of the core and inspection of the interior of the transformers, a pit into which a unit may be lowered exists in the power house floor. For removing these transformer cores a 30-ton crane that travels the generator room is available. This crane is also able to handle the generator and turbine rotors.

Each transformer is of the outdoor shell type and has a rating of 5000 kv-a., 30 cycles and changes the voltage from 7500 to 140,000 volts. Taps are brought out to permit changing the voltage from 120,000 to 140,000 volts in 5000-volt steps so as to permit the outgoing voltage to be changed should operating conditions require. The transformers are connected in delta on both high and low-voltage sides. Disconnect switches are installed on the 7500-volt side of the

transformers and quickly-opened joints on the high-two transformers connected in open delta. Cooling water for the transformers is pumped from the penstock by a centrifugal pump. Special precautions have been taken to prevent the water pipes carrying this cooling water from being frozen in winter by covering them and submerging them well beneath concrete. The oil from the transformers is circulated through a storage tank of about 8800 gal. capacity.

Circuit breakers installed upon a concrete foundation are inserted between the transformers and the out-going line. These are 140,000-volt non-automatic, solenoid-operated oil circuit breakers with a rating of 300 amperes at 140,000 volts. Between the outgoing line and the circuit breakers electrolytic lightning arresters are connected, being also installed upon a concrete foundation. A derrick is available for

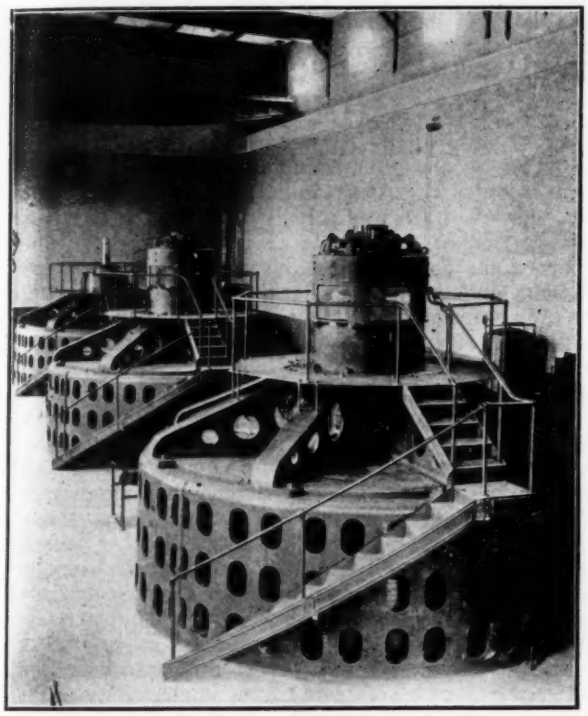


Fig. 3.—Three 5500-kw. Vertical Waterwheel Generators.

ready handling these arresters. All high-voltage buses and conductors are of galvanized-iron pipe supported by 10-unit suspension insulators from a galvanized-iron structural steel frame. The lightning arrester horn-gap charging apparatus, and the 7500-volt conductors connected to the 7500-volt transformer coil and disconnects are mounted upon pipe frames. A bank of 25 kv-a. transformers, 7500 to 2200 volts, 30 cycles, are installed for supplying station lighting and power for the auxiliaries and ancillary apparatus.

The switchboard is located on the generator floor on the shore side. This board (Fig. 5) is of black slate, and contains the panels for the three generators, for the outgoing circuits, for station power, etc., and two panels for future lines. From Fig. 5 each generator is seen to be protected by overload relays, but these are operative only so long as connected through the synchronizing plug, that is while synchronizing a generator. The rheostat wheel seen on each generator panel is that of the individual exciter rheostat for each generator, which is hand controlled; the rheostat being located at the immediate rear of the switchboard. Exciter rheostats are used because a Tirrill regulator is used. The generator-field rheostats are motor-operated, and are located on the floor above the switchboard.

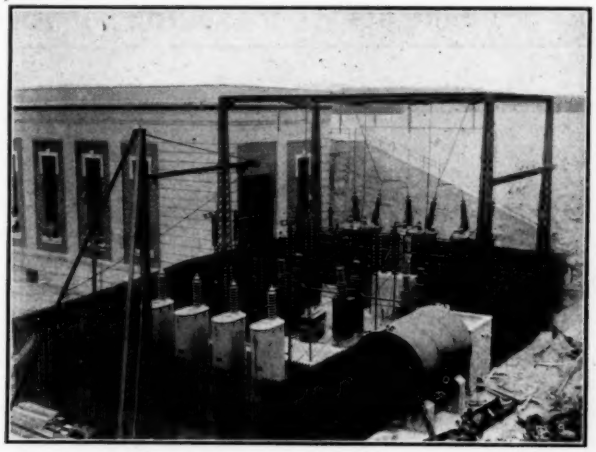


Fig. 4.—View of Outdoor Substation Showing Three 5000 kv-a. 140,000-volt Transformers, Circuit Breakers and Lightning Arresters.

A 60-cell storage battery with a rating of 112.5 ampere-hours, is located on the floor above the generator floor, which is the second floor. This battery is charged by a 2.25-kw. motor-generator set. Control circuits are operated from the battery, or from the motor-generator set, as circumstances dictate.

The out-going 140,000-volt transmission line goes to Grand Rapids, some 101 miles distant. This line is carried by double-circuit steel towers galvanized and bolted together and placed about ten to the mile. The towers were delivered on the ground "knocked down," were erected by jin pole to anchors set by template. Basket anchors are used, sunk 7-ft. deep. The towers ordinarily were set in earth, except at railway cross-

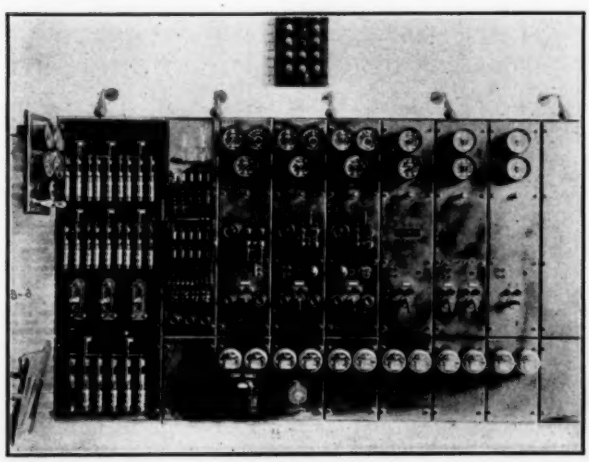


Fig. 5.—Switchboard Controlling Junction Dam Hydroelectric Development.

ings, corners and special locations where rock filling, cribbing or concrete was employed. The conductors comprising the present circuit (a second circuit may eventually be strung) are three No. 0 copper wires, spaced 12 ft. apart in vertical plane. These conduc-

tors were strung by dynamometer. String insulators support the conductors, 10 units being used on straight suspension and 12 units for strain. An overhead grounded conductor is not employed.

A telephone line parallels the 140,000-volt line. This line is of No. 8 galvanized iron wire, and is carried on cedar poles supported by porcelain insulators.

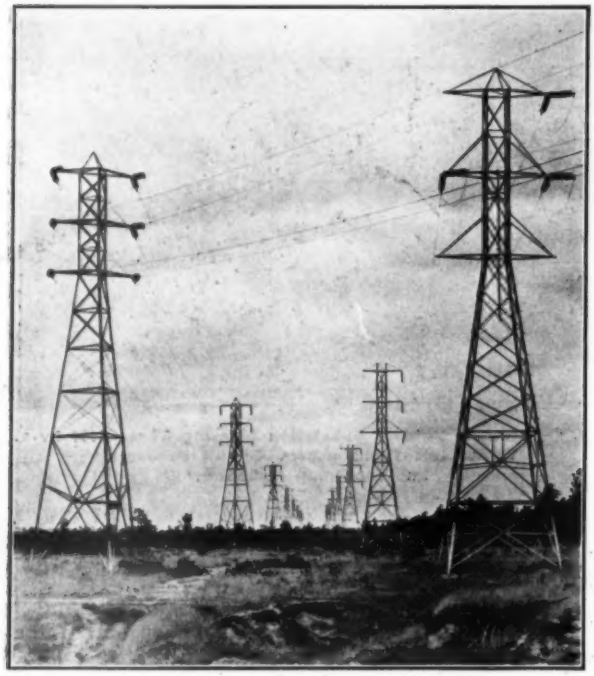


Fig. 6.—Section of 140,000-volt Transmission Line.

Telephone wires are transposed every five poles. Crossarm space permits of a duplicate telephone line being strung when required.

The entire electrical equipment was furnished by the Westinghouse Electric and Mfg. Co. The turbines are the product of Wellman-Seaver-Morgan Co. and their governors those of the Lombard Governor Co.

NATIONAL FOREIGN TRADE COUNCIL TO MEET IN CHICAGO.

Plans Under Way for Sixth Convention to Be Held in April.

The National Foreign Trade Council will hold its sixth National Foreign Trade convention at the Congress hotel, Chicago, April 24, 25 and 26. The formal call for this meeting will be issued shortly by the Chairman of the Council, James A. Farrell, president of the United States Steel Corporation.

In the past these conventions have drawn an increasingly large number of the prominent business men of the country, representing all forms of industry, commerce, finance and transportation. To these will now be added the representatives of labor. In this way the delegates will be supplied with a broad view of the business situation, with specific information to meet their individual needs, and with advice and inspiration for the coming year.

The convention in April will deal with foreign trade as a factor in stabilizing American industry—problems involving the conversion of war industries to the needs of peace; development of our foreign trade to provide employment of our soldiers, sailors, and war workers; and the formation of a definite policy dealing with the future of our new shipping.

The procedure of the convention will be along the lines that have proved so successful in the past: general sessions with prepared papers by the leading authorities, followed by discussion; group sessions, consisting mainly of discussion, in which the special interests of different types of business are treated; individual conferences with Government representatives and trade advisers.

It is expected that the attendance this year will be unusually large. There is a growing realization throughout the country that foreign trade is essential to continued prosperity, and many concerns are turning to the foreign field for the first time. For these the convention offers an unusual opportunity to profit by the experience of older export firms and to learn the general policies of the country in respect to foreign trade.

NAVY AGAIN OPEN FOR VOLUNTARY ENLISTMENTS.

Owing to the great publicity given to the demobilization of the Army and Navy and the fact that thousands of sailors and soldiers are being released, a large portion of the people of this country are unaware of the fact that the Navy is again open for voluntary enlistments and that it is seeking young men who are anxious to enter the service, to obtain valuable instruction for which the Navy is so noted and to have the opportunity of seeing the world at Uncle Sam's expense.

Excellent opportunities are offered to young men who desire to become electricians or machinists by trade. Men between the ages of 18 and 35 and who have had a small amount of machine-shop experience may enter the service and go through a complete machinist's course at the Machinist School, Charleston, S. C. Opportunity is also offered to men between the ages of 18 and 30 who desire to become electricians by trade, who have a theoretical knowledge of electricity and who have had some practical experience in electrical work. Men enlisted in this branch of the service are given a complete course in electricity at the Electrical School, Hampton Roads, Va.

COMMISSION SUSTAINS MINIMUM CHARGE ON CONNECTED-LOAD BASIS.

The Pennsylvania Public Service Commission recently rendered a decision approving the minimum charge based on the connected load as charged by the State-Centre Electric Co., Bellefonte, Pa. The complainant in this case was a quarry company using a 40-hp. motor but which only required 20 hp. for its present needs. The actual consumption of this motor amounted to between $10 and $15 per month, as it was seldom used, whereas the minimum charge was $40 per month. The company was willing to fix the minimum at 20 hp., but this was not approved by the Commission as it would be setting up a discriminatory situation as far as other customers were concerned. The company, after an investigation, reduced the minimum charge for motors of from 5 hp. to 50 hp. to 75 cents per hp. per month. The complaint was still pressed but was dismissed by the Commission upon the company putting the supplemental tariff into effect.

Linking Science and Art in Lighting

Fifth* of Six Articles Dealing with Esthetic Interior Lighting—How the Lighting in Middle-Class Home Can Be Made Pleasing and Varied at Moderate Cost—Opportunities for Development

By M. LUCKIESH

Nela Research Laboratory, National Lamp Works of General Electric Co., Nela Park, Cleveland, Ohio.

PART V.—LIGHTING OF A MIDDLE-CLASS HOME.

FOR many reasons the middle-class home represents a large field of lighting in which a great deal of educational and development work should be done. In the first place, residences of this class constitute the major portion of the residential lighting business; furthermore, householders of this class cannot afford to pay for independent expert assistance of a lighting artist. They put their trust in the fixture-dealer and they are entitled to reasonably adequate assistance. The lighting of homes of this class is so important, so much neglected and so unintelligently or indifferently treated, that it appears worth while to include in this series of brief articles a simple discussion of the procedure adopted in a middle-class residence. An attempt will be made to treat the details of importance and various correlations of other aspects of the interior with lighting.

LIGHTING OF THE DIFFERENT ROOMS.

General Remarks.—There are eight rooms in the house under consideration: Living room, dining room and kitchen on first floor; two bedrooms, den and bath on second floor; two rooms on third floor. The house is generally Colonial in type. The ceilings are approximately 8 ft. above the floor. The wall-covering of the living room, dining room, vestibule, stairway, and upper hall is the same throughout, being a warm light gray with a minute pattern simulating the effect of texture. The ceilings are a cream-white. This uniform treatment of the first floor in the small house has the virtue of apparently enlarging the rooms. The absence of decided color or pattern makes for a covering that performs the true function of wall-covering in such rooms of the small home, namely, it serves as a background for decorative ornaments, furnishings and lighting effects. The latter can be obtained in an extensive variety if the wall-coverings are of medium or fairly high reflection-factor. The woodwork in these rooms is stained a brown mahogany, with the exception of the cornices in the living and dining rooms, which are painted an ivory white of dull finish. Incidentally, a dull finish was used throughout the house which is not only desirable from the viewpoint of artistic appearance but from that of lighting. The finish upstairs is a dull ivory-white, with the exception of the den, which is finished in walnut, with moderately dark brownish wall-coverings. The wall-paper in the other rooms is more decorative but of small pattern in light tints and shades. The bathroom is ivory white. These general remarks will be supplemented by a discussion of the lighting of individual rooms.

Living Room.—This room is 14 ft. by 25 ft. with an 8-ft. ceiling. It was considered that fixtures hung from the ceiling would rob the room of one of its delightful characteristics, that of apparent magnitude. Furthermore, a ceiling fixture must be placed according to the demands of symmetry which would result in a symmetrical lighting effect. The latter is considered to be generally monotonous and inartistic and cannot be fitted into the esthetic scheme of furnishing and lighting without greatly restricting the possibilities. Brackets were considered as purely decorative highlights but were not installed except over the fireplace at one end of the room. A bookcase and a stairway door, respectively, flank the fireplace and over the latter a receptacle was installed. The brackets are of the Colonial type and are equipped with large plain etched opal bowls, 7 in. in diameter, and 10-watt frosted lamps toned a warm yellow-orange. These brackets are controlled by a switch near the stairway door and thus provide light on entering from upstairs. The brackets are not glaring, as is commonly the case owing to the large diffusing bowls and small lamps. Bracket fixtures should not generally be depended upon for purely utilitarian lighting, the lamps should be small and well shaded, and the light should be well diffused. It is impossible to avoid glare if the brackets are mounted on dark backgrounds.

Fig. 1.—Day View of the Special Floor Lamp for Giving Direct or Indirect Lighting or a Combination of the Two.

Two circuits were run to the center of the ceiling and these are controlled respectively by switches at the front vestibule and near the stairway door (opposite ends of the room). These circuits are not used but were installed for a central fixture in case it may some time be desired. Six receptacles are distributed in the baseboard and the room is lighted very largely

*The first four of these articles appeared in the ELECTRICAL REVIEW of Oct. 5, Nov. 2 and Dec. 7, 1918, and Jan. 4, 1919.

from these outlets by means of portables providing various effects. At the front end of the room (the opposite end from the fireplace) a decorative reading lamp is used on a library table. The receptacle to which this is attached is controlled by a switch at the vestibule door. Near the center of one long side of the room, a floor lamp (see Fig. 1), giving direct and indirect components of light, is installed and may be easily moved to suit the arrangement of furniture, which differs considerably in winter and in summer. It is generally placed near a comfortable divan and is used not only to flood the room with light on various occasions but as a reading lamp on others. From these portables and the two brackets a variety of effects are obtained. There are generally two or three small decorative portable lamps distributed about the room and used whenever they suit the fancy. Thus, without limiting the variety of effects, as would be the case with fixtures rigidly fastened to the ceiling, and

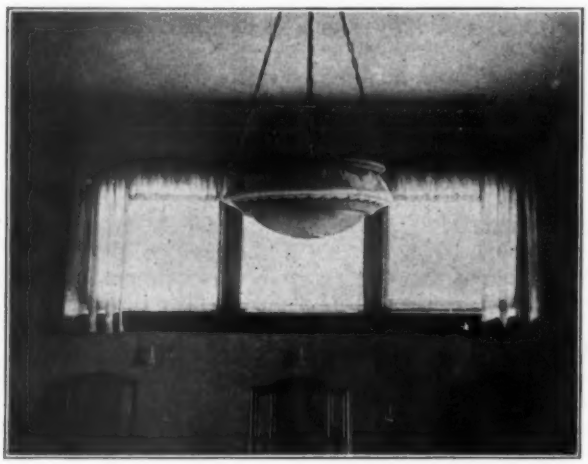


Fig. 2.—Special Unit in Dining Room for Obtaining Three Different Lighting Effects in a Relatively Simple Manner.

without detracting from the appearance of the room, a wide variety of lighting effects is obtainable. Furthermore, the portable fixtures are important elements in the furnishing and may be moved about to suit the householder. There is no desire to disparage the use of ceiling fixtures but in this case the result is much better without them. The generous supply of base receptacles is found to be a constant source of satisfaction.

Dining Room.—This room is about 14 ft. square with a wide opening into the living room. It was desired to illuminate the table highly and generally to leave the remainder of the room in a dim flood of warm light; however, a degree of variety in tint and distribution of light was also hoped for. The "old-fashioned" dome would fill the first requirement but another type of fixture appeared appropriate. From the variety of glass bowls and shades available a combination was made which has much merit, especially when its simplicity is considered. This general scheme was described several years ago and the details of this unit are available elsewhere.* However, with the aid of the illustration and a few remarks, it is hoped that it will be proved that variety and definite results in lighting may be obtained very simply. The unit appears, to the casual observer, to be a semi-indirect bowl (see Fig. 2). It is toned with a delicate ivory tint and has some ornamental designs in delicate colors. It is supported by silvered metal work and possesses two circuits controlled by wall switches. One circuit has four sockets in which 10-watt (warm yellow) frosted lamps are placed as in an ordinary semi-indirect bowl. These supply direct and indirect components of light of low intensity and pleasing tint. The other circuit has one socket centrally located and equipped with a narrow opal shade about 7 in. long and with a 3¼-in. apperture (just visible in Fig. 2) which is fitted to a circular orifice cut in the center of the large bowl. The outside of this central shade is toned a warm yellow and the light from the central lamp which passes through the sides of the central shade is thereby tinted a charming color. The direct light from the central lamp escapes from the 3¼-in. orifice in the center of the outer bowl in the form of a cone and by means of the mechanism provided, the vertical position of the central lamp can be altered until the cone of light nicely covers the table. Several minor details are omitted from this discussion, but it is seen that by this scheme the table is brightly illuminated; the eyes are shielded from this intense beam; no glaring sources are visible to the eyes; by using the central lamp alone the indirect component is of low intensity and the bowl is of low brightness and warm tint; by means of the two circuits providing different distributions of light three different effects can be obtained.

A base receptacle is provided for appropriate electric candlesticks on the buffet and another for various accessories.

Kitchen.—It is 11 ft. square, has cove ceilings and is painted a warm gray of two shades—medium and light. An electric socket, equipped with a glass shade of extensive distribution, is placed at the center of the ceiling. This provides clearance which is not available with the common arrangement of a combination fixture extending downward from the center of the ceiling. A combination wall-bracket is placed over the sink and a receptacle is provided over the work-table for various accessories.

Den.—This is on the second floor and is 10 ft. by 14 ft. It is finished in walnut and the walls are covered with a grayish-brown-grass cloth. Two wall-brackets with large opal bowls provide a general illumination of low intensity. They are equipped, usually, with 10-watt lamps toned a yellow-orange tint. Two base receptacles are provided for portable lamps which are used for reading purposes.

Bedrooms.—Those on the second floor are about 14 ft. square. The wall-coverings contain small floral designs. A circuit to the center of the ceiling and controlled by a wall switch was provided in each room during the construction, but is not used. In all cases where the circuits are provided but not to be used initially their outlets were marked but sealed up when the house was plastered. A pair of wall-brackets about 5½ ft. above the floor were placed in the position which had been predetermined for the dressers. For dressing tables these brackets would be located lower or two small decorative lamps would be placed respectively at each side of the mirror. The fixtures of silver finish were selected to harmonize with the other features of the chambers and the glass shades were decorated with colors similar to those in the wall-paper. In each chamber a base outlet was installed where it would be most useful. These are used at present to connect small decorative lamps near the beds.

*Page 141, "The Lighting Art," by M. Luckiesh; McGraw-Hill Book Co., New York.

The chambers on the third floor each possess two outlets with simple fixtures appropriately placed and in each case a base receptacle is available.

Bathroom.—The room is finished generally in ivory-white and the chief problem was to provide a satisfactory illumination at the mirror. There are two chief aims in such cases: (1) to direct the light upon the face in such a manner that there will be no deep shadows, and (2) to avoid annoying glare. These two aims are generally opposed to each other but the light surroundings in a bathroom make it possible to avoid undue glare. A small nickel-plated fixture was placed on each side of the mirror at a height of 5 ft. These may be equipped with opal shades, but in this case opal lamps were used bare with excellent results. A simple unit over the center of the mirror is not as satisfactory as the foregoing installation and, of course, a unit in the center of the ceiling does not illuminte the face satisfactorily as a person looks into the mirror. It is necessary to illuminate the face for shaving purposes, etc., and this can be done without annoying glare and bad shadows by means of two units, one on each side of the mirror.

Other Places in the House.—Halls, vestibules, porches, etc., were generally illuminated by means of ceiling fixtures; in some cases enclosing diffusing glassware is used and in others open glass reflectors and bowl-frosted lamps are more satisfactory. A generous supply of outlets are installed in the basement over laundry trays, over workbench, in toilet room, in fruit cellar, near the furnace door, and near basement entrance. These are very convenient and justify their existence daily.

Splendid Opportunities for Obtaining Pleasing Lighting Effects in the Home.

Owing to the diversity of the activities pursued in the home, residential lighting is one of the best fields for combining science and art. In larger houses the architect can design many features which may provide pleasing lighting effects. Owing to the importance of light in the home and its extensive possibilities, it should be the aim not merely to provide a definite unalterable lighting effect but to provide, by means of a generous supply of base receptacles, switches and circuits, a degree of variety in lighting effects which will make it possible to illuminate the various settings appropriately. This will insure against monotony and will bring to the householder the pleasures of appropriate lighting for various moods and occasions.

This broader view of lighting the home does not require elaborate special fixtures, because excellent results can be obtained by a closer attention to simple details. The householder's interest is required if lighting is to develop more fully in this direction. His interest will be obtained by supplying him with wiring, outlets, circuits, fixtures and lamps which provide interesting effects. Such effects are those which fit various moods and occasions. Until the householder's interest is obtained by concrete results he will not appropriate adequately for lighting. Light in the home is only secondary to food and shelter but owing to his lack of education and of experience in this direction he views the lighting of the home indifferently and quite out of proportion with its importance and possibilities.

(*To be continued.*)

Residential lighting is concerned more with effectiveness than with economy. Small units in larger numbers are more artistic than a few units.

EMPLOYMENT BUREAUS FOR RETURNING SOLDIERS AND SAILORS ESTABLISHED.

Special Branches of United States Employment Service Established in Chicago and Other Large Cities.

The time has arrived when every employer can be of real service to the returning soldiers and sailors by offering them employment.

In order to centralize the effort, an employment bureau in the Chicago district has been established under the direction of a National Council, co-operating with Red Cross, Y. M. C. A., Army, Navy, commercial, church, labor, farm and other Chicago organizations. This employment bureau has available for industrial enterprise a large part of the nation's choicest manhood. Never before has there been offered a supply of workers of such high class. Not only are these men physically fit and strong and full of initiative, but they have quick military snap, yet orderly power, the result of organized training and discipline.

If the employers lose this chance to hire these men —to infuse their "pep," clean-cut characteristics, their spirit to win—into their establishments, they miss the one great passing opportunity.

Aside from the advantage the employer has in getting men of high quality, he also, by placing his orders for help with the Bureau, does his share toward providing a means for the returning men to make up in part for the small pay and many hardships which they have experienced during their period of service. In many cases it will pay the employer to take a few more soldiers and sailors than he might have actual use for at this season, because the opportunity to get men of this character is a passing one, and it is good business to have plenty of help to handle the predicted approaching prosperity.

The United States Employment Service of the Department of Labor has established these Bureaus for returning soldiers and sailors not only in Chicago, but at other principal points throughout the country, and readers who reside at other points than Chicago should make use of their local Bureau. Orders for help from the Chicago district should be addressed to the Bureau for Returning Soldiers and Sailors, 58 West Washington street.

CHICAGO ELECTRIC CLUB HEARS MAJOR GRAY.

The Electric Club of Chicago was addressed at its noonday meeting on Jan. 16 by Major Ainslie A. Gray, well known to our readers as the former managing editor of the Electrical Review, who had a few days before been released from military service. His interesting and instructive talk touching on the accomplishments of the Ordnance Department and the part the Chicago manufacturers so ably took in their share of the program eliminated any thought of petty criticisms on the part of his audience.

He was followed by J. A. Davis, a very able speaker, who is serving the Government as a financial expert at a dollar a year. Mr. Davis' talk dovetailed splendidly with Major Gray's remarks and inspired his listeners with patriotic enthusiasm for the peace program and its opportunities. His concluding remarks carried a realization of the need of Americans to subscribe liberally to the Victory Liberty Loan when issued.

Making the Electric Fan More Useful

Manufacturers and Others Advocating Year-Round Uses for Electric Fans—Merchandising Policies and Service—Calling Public's Attention to Successful Miscellaneous Fan Uses

ONE of the very first electrical appliances to be introduced after electric lamps came into general use was the portable electric fan. It was not long after the electric motor was developed into a practical machine that it was found possible to make motors of small enough size to be fairly portable. Although clumsy and ponderable compared to present-day models, it did not take long to conceive that by attaching fan blades to the armature shaft it would be possible to make a convenient machine-driven fan to take the place of the old palm leaf and other tediously hand-operated fans. About 1890 the first of these fan motors, as they were called in the early days, was introduced and met with instant popularity as a means of creating a cooling breeze in offices.

From those early days electric fans have been rapidly developed in efficiency, portability, appearance and general utility; at the same time the price has been considerably reduced, except during the abnormal period of the war now drawing to a peaceful close. Throughout these 30 or so years the electric fan has remained primarily a means for creating cooling breezes during the relatively short torrid season of midsummer. It is true that other uses have been made from time to time, but the public has not known of them generally and has applied them to but a very limited extent. Articles have appeared on this subject in this and in other electrical papers at various times, but manufacturers and especially dealers have until practically this year continued to feature the cooling action of the fan almost exclusively.

Three special articles, each of two pages and entitled "Making the Electric Fan More Useful," were published in the ELECTRICAL REVIEW of Feb. 16, April 13 and June 15, 1918. These pointed out that in spite of its long use for cooling, the electric fan is still used inefficiently for this purpose in very many cases, and a few suggestions for increasing its efficiency for this service were given; other uses were also discussed, such as for aiding ventilation, for drying, for heating, removing frost from windows, advertising, etc., and a plea was made that fan producers and dealers study this entire subject, especially the miscellaneous uses, and bring the matter to the attention of the public. It was shown that general recognition of the fan as an all-year-round appliance would not only increase the utility of the device but also greatly increase its sales. It is gratifying to note that these articles were read with much profit by some of those interested in the fan business and that this year's crop of manufacturers' catalogs, leaflets and other trade literature on 1919 fans for the first time shows advocacy of the general utility of this very useful electrical appliance.

TWO OPPOSING THEORIES OF MERCHANDISING ELECTRIC FANS.

Regarding the sale of electric fans, as of many other electrical appliances, there are two almost diametrically opposing theories. The older one is to carry a modest stock of the more popular devices at practically all times, but make very little special effort to push the sale of any particular device at any time, that is, keep on hand what the public calls for and when the public calls for it without extra effort to stimulate seasonal sales. The newer and more aggressive theory is to make very strenuous efforts to sell particular appliances in special sales especially appropriate to the season, the idea being to move the stock quickly and clear the scene for another campaign. This latter plan has proven very successful in its volume of sales. Both plans have shortcomings, however, and a modification or rather combination of the best features of each is probably the most successful all round plan to follow.

There are undoubtedly seasonal peaks of demands for most electrical appliances; some, in fact, like electric radiators, are distinctively seasonal. However the use of some appliances is greatly restricted if overemphasis is placed on the seasonal campaign for their distribution. This is markedly true of electric fans, which would have come into more extended use if dealers had long ago began to call attention to their utility at other times instead of featuring them as a summer-time convenience alone. The summer demand, of course, will remain greatest but this is no reason why all fans should be hid from the dealer's store as if there were a law prohibiting their display or sale for anything but cooling service. In the articles above referred to suggestions were made to the dealer for keeping some of the other fan uses before the eyes of the visitors to his store, which can be done with little effort and in a small space as a rule. Its merit is that it brings to the mind of the purchaser the fact that his fan is not only an investment for a possibly brief spell of hot weather, but a convenience or almost a necessity for other seasons as well.

The dealer may ask what advantage this is to him. He can readily see that the central station will gladly see the fan or any other appliance used every day instead of only occasionally, but how will this profit the dealer once the fan is sold? This is a simple matter that progressive appliance manufacturers have already answered. The more use there is for any appliance the more demand there is for it and the easier it is sold. Consequently manufacturers are coming to see the wisdom of more demand-creating general advertising and of calling attention to every possible utility to which the appliance can be successfully put. It is time, therefore, that dealers take cognizance of this fact and, while making the special fan sales effort in the summer, remember that a little effort at other times will produce still greater sales and also improve the load-factor or sales-factor of their selling organization. Instead of having a series of rather heavy peak demands followed by non-profitable lulls, the demand will be somewhat smoothed out or at least the lulls diminished if not eliminated.

One of the interesting developments of last year was the placing of large orders for electric fans by various branches of the Government that were most active in the conduct of the war. The city of Washington is quite warm during summer and usually there

is a relaxing of the strenuous work in the Government departments at that time. This was not possible last year, for every effort had to be bent to speedy prosecution of the war. It was realized that this could be done only by making working conditions as comfortable as possible for the army of thousands of clerks and officials, else a marked lowering of their efficiency would result. Thousands of electric fans helped materially in keeping offices, hotels and living quarters fairly comfortable in spite of the crowded conditions prevailing. The same was also true in both the offices and quite a few of the numerous shops of munition plants, shipyards, mills, etc., that were turning out the material to back up Pershing's men at the front. Thus the fan was quietly doing its modest but yet important "bit" to help win the war.

In hospitals the electric fan was also found indispensable. At a New York hospital careful experiments were conducted that showed that the vitality of patients in air that was kept in motion by means of electric fans was about 34% higher than that of the same persons lying in still air, in each case the same temperature prevailing. Although the fact had been known before that circulation of air promotes a more healthful atmosphere, this verification of the general statements made on this subject was very important. In the army base hospitals electric fans were constantly used to improve the health, comfort and morale of both sick and wounded soldiers, and also to force all unpleasant odors and smoke from the buildings and to keep a current of pure air in motion throughout the wards.

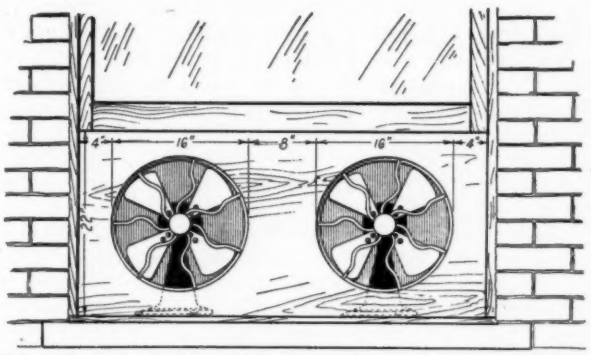
Electric fans were used in many places where food was stored or displayed for sale to keep myriads of germ-laden flies from poisoning the food. An important use advocated by the United States Food Administration last fall and also during the preceding year was as an aid in drying fruits and vegetables, instead of the customary methods of preserving them by boiling. In this way the stocks of sugar that otherwise would have been required were conserved for other much needed purposes.

As an evidence of the recognition by electrical manufacturers that the fan has a much more general utility than was formerly realized is the fact that in its 1919 catalog of electric fans one of the leading makers has devoted two full pages to presentation of some of the facts mentioned above and calling attention to the industrial, hygienic and other valuable uses of the fan. The statement is made that the electric fan is not a summer luxury but an all-the-year necessity. It heightens human efficiency where human efficiency is most needed. It is a material help toward industrial economy through its promotion of health and vigor in home, office and factory. It marks the co-operation of electrical science with the national will to make the present period of readjustment a prelude to the greatest industrial expansion in the history of the United States.

Concrete Examples of Special Uses of Fans.

To many readers general statements have not nearly as much significance as the citation and illustration of definite concrete examples of what may be done by any apparently new proposed method. In other words they are like the man from Missouri who wants to be shown. A few instances may, therefore, be dwelt upon a little more in detail.

One of these is illustrated in the accompanying sketch showing the installation of two ordinary desk fans in one of the basement windows of the Chicago Post Office. The room in which this additional means of ventilation was found necessary is a very large one. It has a fairly high ceiling but the windows are placed so that their sills are approximately 7 ft. above the floor. A mechanical system of ventilation was provided which proved inadequate in winter. The air in the room became close and stuffy and the efficiency of the many clerks employed therein was materially lowered. During the summer it was customary to open these windows wide and get considerable natural ventilation. It was found that in order to aid the mechanical system in winter it would be necessary either



Using Two 16-In. Desk Fans on an Elevated Window Sill to Remove Vitiated Air from a Large Room.

to provide additional exhaust fans or their equivalent.

A considerable number of desk fans are employed in the building in the summer and as a rule these have been stored away during or before October, and again brought out in May. By fitting up a board approximately as shown in the sketch and placing it in the opening when the lower sash was raised it was possible to place these fans directly on the window sill and turned so as to blow outward, thus very materially increasing the removal of vitiated air. In this particular room at least two windows have been fitted up in this way, and excellent results obtained. In other rooms the same scheme is being used. Of course, such a use is not to be recommended in place of regular exhaust fans that are usually placed in the upper sash of the window. In this case, however, the sills being high and the additional ventilation being needed only during winter when the desk fans were not in use, the plan works out very advantageously.

There are numerous instances where ordinary desk fans can be utilized as aids to ventilation. Sometimes for blowing fresh air in they may be placed on the sill. Oscillating fans are a material aid to improved air condition, for they may be used to drive the air in the general direction of the exhaust outlets while at the same time stirring it up and keeping it in active circulation. This has been done successfully in many theaters, especially movie houses.

Using an Electric Fan to Keep Warm.

An electric fan can be of such valuable assistance in heating a house that every house should have one as part of its heating equipment. There are a number of excellent uses for fans as money-savers for coal users, in these days, when coal is still so hard to get, as well as so costly. An electric fan actually saves money for the user, as it helps to do the job of heating the house by distributing more of the heat through the house and allowing less of it to slip away up the chimney.

Every householder, whether he is using a hot water, steam or hot-air system, can save money and coal. Let us suppose that a closed room is to be heated with a single radiator which receives its heat supply from a hot-water boiler. The effectiveness of that radiator depends on two things only: First, the rapidity with which heat is supplied to the coils in the boiler; second, the speed with which the heat is carried away from the system into the room.

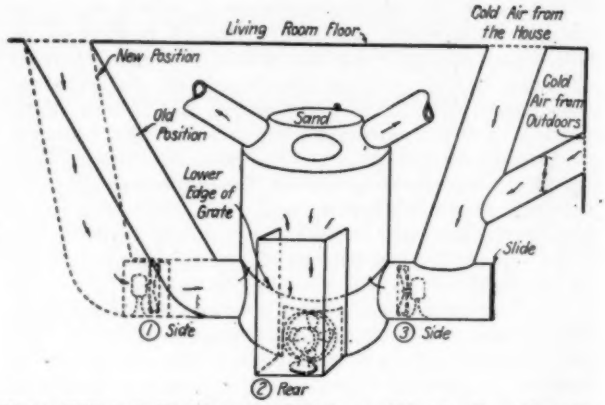
Naturally the first object is to get the water as hot as possible in the furnace and send it back from the radiators to the furnace as quickly and as cool as possible. If it could be sent back at room temperature the system would be working at highest efficiency. Consider the things that happen while the room is heating. First, the air directly around the coils is heated; second, the heated air rises to the ceiling; third, a layer of hot air spreads over the room; fourth, it gives up its heat to ceilings, walls and surrounding air; fifth, it drops to the floor; and sixth, it flows back to the base of the radiator to begin the cycle all over again.

There are only two ways by which the efficiency of a convection system of this sort can be improved. One is by adding more coils to the radiators, and the other is by increasing the speed of the circulating air, that is, by forcing a current of air past the coils to carry off the heat more rapidly. The first way involves more expense, the latter involves only a small investment in a fan, which can be used both summer and winter for many years.

In the case of a steam-heated house, the heating of a room is indicated both by the movement of air and by room temperature taken at the point farthest removed from the radiator. When forced circulation is introduced, the change made in the normal conditions is really surprising.

An electric fan may also be used to increase the efficiency of a hot-air furnace. A furnace used to heat a seven-room house had four risers to carry hot air to the various parts of the house. Cold air was taken from the basement. Normally this furnace could not keep more than three risers hot at a time and it seems that no amount of changing drafts could set things right. A good deal of coal was wasted in trying to keep the house warm until the owner hit on the plan of blowing the cold air into the heating jacket with an 8-in. fan. The accompanying illustration shows this Westinghouse fan in service. There has not been the slightest difficulty since the new plan was adopted.

An 8-in. Fan Placed at the Cold-Air Inlet of a Furnace to Increase the Air Circulation.



Three Different Positions in Which an Electric Fan May be Placed to Aid Furnace Heating.

The United States Fuel Administration for Illinois has prepared the second illustration showing how an electric fan may be placed in any of the three different ways to aid in accelerated circulation of the air through a furnace. If the side return is short and closed, as shown at (1) at the left, it is swung back and a short connecting piece is inserted into which the fan is placed. If the cold-air inlet is open to the basement and placed as at (2) at the rear, the fan is merely placed at the base of this inlet chamber. If a side inlet is provided with a removable slide as at (3) at the right, this slide is merely opened and the fan inserted to the position shown dotted. It may be necessary to place a block under the fan base to give it a firm support when setting it in a round pipe.

These arrangements have no connection with and in no way effect the firing except that much of heat generated, which would otherwise go up the chimney, is by this method absorbed by the increased air volume passed through the jacket of the furnace and sent into the living rooms. The cost of current used is negligible compared with the coal saved, which varies from 10 to 25%, and the circulation of heated air throughout the house is much improved.

These are but a few of the uses of the common electric fan that are not well known to the general public. These and still other uses are bound to become more appreciated with time as they come more and more to the attention of both present and prospective users of fans. Some of these uses, such as for heating, have been advocated for several years, but it took the stress of a bad coal situation during the war to emphasize their value. Likewise, the other as yet little employed uses will doubtless be forced to the front and be made available to the "man on the street." It is not too optimistic a statement to make, now that the fan manufacturers are actively bringing the various non-cooling fan uses to the attention of the public, that before many years the fan will come to be as much used all the year round as any of the simpler electrical appliances.

Association of Electrical Inspectors Discusses Post-War Problems

Fourteenth Annual Meeting Considers Timely Inspection Problems —Conservation Through Standardization of Electrical Devices— Legal Status of Electrical Rules—Combined Fire and Safety Code

THE Western Association of Electrical Inspectors opened its fourteenth annual or "post-war problems" convention at the Hotel Sherman, Chicago, Jan. 28. This Association has established an enviable reputation in the past for progressiveness and the thorough manner with which it investigates and renders decisions on various subjects. Its meetings therefore are of great interest not only for the amount of information which they bring out but because of the influence which they have upon the formation of the National Electrical Code and the various municipal codes which are based up this code. The meeting this year was even more interesting than those of previous years for it brought out in addition many problems which are especially important at this time. President L. Lucas, of Toledo, presided.

At the opening session the members were welcomed by Harry Miller, prosecuting attorney of the City of Chicago, who complimented the members on the work they were doing and the high esteem with which the electrical inspector has come to be regarded. C. K. Cregier, first vice-president of the association, responded. Following this President Lucas briefly related the activities during the past year and the report of the Executive Committee and that of the secretary and treasurer were presented by William S. Boyd of Chicago.

Mr. Pierce's Address.

Dana Pierce, of New York City, chairman of the Electrical Committee of the National Fire Protection Association, then addressed the members on the subject, "The Making of Electrical Rules." Closely associated with the formation of rules since the introduction of this work, Mr. Pierce is especially well qualified to explain it. In introducing his subject the speaker briefly reviewed the history of this work from the time of its origin to the present efficient methods by which it is accomplished.

The formation of rules governing the installation of electric wires was started by the insurance organizations about 20 years ago. At first these rules were compiled independently by the various companies but the wide diversity of the requirements of the various codes soon demonstrated that they were unsuited for this work. This led to the formation of the Underwriters' National Electrical Association, an organization composed of a group of self-appointed men interested in inspection work. This organization was not vested with any authority and its rulings were often vague and indefinite, but the personal qualifications of its members soon brought it consideration and respect. In 1911 the Electrical Committee of the National Fire Protection Association was formed, composed of representatives of the following associations: American Electric Railway Association, American Institute of Electrical Engineers, Associated Factory Mutual Fire Insurance Companies, National Association of Electrical Inspectors, National Board of Fire Underwriters, National Electric Light Association and the National Electrical Contractors' Association. The rules of this committee, now commonly known as the National Electrical Code, are the most generally adopted and recognized rules of any set of engineering rules in the world.

As proof of this statement, Mr. Pierce referred to the existing conditions in England. Although a set of wiring rules has been compiled by the British Institution of Electrical Engineers, many of these rules are too general and their application is largely a matter of individual opinion. There are no definite universal specifications governing the manufacture of different fittings and appliances, and the fact that different specifications are required in various cities makes this problem more bewildering. The electrical consulting engineer usually makes his own specifications and rules and the result largely depends upon the qualifications of this man. That this condition is allowed to exist is probably due to the different types of building in England and the absence of the rapid growth of communities and new buildings.

In the developing and forming of rules two distinct and apparently opposing factors or tendencies enter and both must be considered. The first factor is the attitude of the inspector and others in similar positions to provide greater strength, more protection and less possibility for danger. The other is the engineer's, contractor's and manufacturer's viewpoint to develop new, more efficient and less difficult methods. The tendency of the first is to be conservative and maintain at all costs the highest standards—the second, to expand and provide easier and cheaper methods of installation. Both of these factors are essential and both must be given consideration. Mr. Pierce also commented upon the growing need of electrical inspectors who have sufficient engineering knowledge to distinguish between a proper and improper installation and who are capable of viewing the subject from both the engineering and inspection standpoint.

C. W. Babcock Explains Validity of Ordinances.

Mr. Pierce was followed by Charles W. Babcock, assistant city attorney of Milwaukee, Wis., who spoke on "The Validity of Ordinances Regulating the Sale of Electrical Devices and Material." Mr. Babcock explained the necessity for careful inspection and the general tendency of state governments towards making the electrical inspector a civil service employe and the licensing of electricians and contractors.

The right of a state or civil government to enforce ordinances governing the installation of electric wiring is received from what is known as the "police power" which provides that such governments may make certain laws which safeguard the life, health and happiness of their citizens. The principal feature to be guarded against in drawing up such ordinances

is not to be unreasonable or have rules which are not practical and not to include rules which restrict the use of certain types of apparatus to the exclusion of other makes. Mr. Babcock also explained that such governments may be held liable for damages which may occur from conditions which a person with ordinary knowledge would know are hazardous. Such governments may also place a certain tax or fee on inspections, the revenue from which is devoted solely to the maintenance of the inspection department but which cannot be used in any other way. Ordinances should also have a so-called "blanket clause" in addition to the specialized details for prosecuting offenders. Such a clause, it was pointed out, will enable the authorities to make a general charge of violation with a reasonable assurance of proving the case and which will only embody one offense, whereas, if only specialized detail offenses can be charged, several must be made and probably several independent fines must be paid.

The same authority which gives the municipal or state government the right to make laws governing installations also grants it permission to license electrical contractors or journeyman wiremen. However, it is illegal to make a rule which legislates a man or firm out of business and this fact must be recognized when drawing up the ordinance. Mr. Babcock also advised the members not to embody in such ordinances the National Electrical Code as such, but to formulate their own rules based on the Code.

The sale of substandard and unapproved devices in a certain district for use outside of that district, according to Mr. Babcock, cannot be controlled. The question of controlling such sales by licensed dealers by revoking the license is still open, as such steps have not been attempted thus far.

J. B. MacNeil, of the Westinghouse Electric & Manufacturing Co., then addressed the members on the "Economy of Small Capacity Circuit Breakers." In his paper, which will be reproduced substantially in full in a later issue, Mr. MacNeil brought out very clearly the different features of the modern types of circuit breakers and the methods of determining the proper sizes of them.

Conservation Through Standardization.

At the afternoon session W. H. Merrill, president of the Underwriters' Laboratories, opened a symposium on "Conservation by Standardization." He took as his subject, "Its Practicability Proved Under War Conditions" and spoke particularly of the work of the Conservation Division of the War Industries Board, directed by Mr. Shaw. The success of this work was due chiefly to conferring directly with the industries concerned, these being called on to advise the Government as how best to eliminate much waste of material and effort in producing special types and sizes of products that were purely attempts to create competitive goods. The war service committees of the industries reported that most manufacturers were not really anxious to make these extra types and sizes but did so frequently to please some particular salesman or customer. In the electrical industry it was found that knife switches and fuses were already well standardized and superfluous types did not exist to appreciable extent. Of course, the primary object of this standardization was to reduce the demand for raw materials and labor to the greatest reasonable extent so as to release these for the actual needs of the war.

Mr. Merrill said he was glad that the end of the war prevented consummation of the attempts to substitute iron for copper in knife switches and other electrical devices. As to standardization, he felt that what had been accomplished was of permanent good by its restriction of the evidently superfluous, but that it was not advisable to push standardization too far and thus choke off progress and useful development.

F. S. Wilhoit, of the Cutler-Hammer Manufacturing Co., reviewed in more detail the work of the General War Service Committee of the Electrical Industry in co-operation with the War Industries Board. It was found best to try to eliminate superfluous types and sizes and much was accomplished in this line. For instance, about 80 of the 100 odd different types of sockets and receptacles could be dropped. A standardization committee of the War Department also began to take up this work independently, but finding that the War Industries Board was already working it out, a co-operative arrangement was effected successfully. The work was therefore greatly facilitated. Efforts were begun to develop interchangeability of motor equipment. Recommendations were made for certain eliminations in control equipment, standardization of meter loops, switchboard instrument connections, and nearly 70% of small electrical devices were suggested to be dropped. It was further suggested that about 80% of conduit fitting types, 60% of dry cell types, 85% of ordinary panels and switchboards and 75% of safety panels be eliminated. Fan motor types and sizes were greatly reduced shortly before the close of the war and substitution of sheet steel was made for brass in blades and guards. Heating devices were also reduced in sizes and types.

The wire and cable manufacturers suggested the most radical innovation by making up stranded cables with only standard B. & S. gauge wire instead of using a large variety of special wires for the strands; it was estimated that it would be possible to reduce to one-third the amount of copper stock formerly tied up on this account. These latter suggestions were opposed by some power engineers. In general, the standardization and conservation work that was effected was based entirely on the recommendations of the organizations of the electrical industry. Much of the work was actually carried out on orders of the War Industries Board whose authority was terminated at the close of the year. However, at the suggestion of Secretary of Commerce Redfield, committees are now working for a continuation of the program during the readjustment period.

C. H. Roth, secretary of the Electric Power Club, briefly reviewed some of its activities, especially as to standardization. The club was formed in 1910 and has as its membership 90% of the manufacturers of motors and generators, controllers and transformers. These producers manufacture 98% of the total output in these lines. The club has steadily been working out standardization problems and has some 30 committees. Throughout the work of the club it has been found that co-operation between the manufacturers and the purchasers of their product was beneficial to all. He believed that co-ordination of the ideas of engineers, manufacturers and inspectors would bring about the best results. Standardization through restrictive rules that would bring hardship and retard development should be prevented.

Combined Electrical Fire and Safety Code.

One of the most important subjects before the convention was introduced by the address of Morton G. Lloyd, electrical engineer of the Bureau of Standards, on the subject, "The Combined Electrical Fire and Safety Code." There are three groups of electrical

inspectors, first, those representing insurance interests; second, inspectors of municipalities, and third, inspectors of operating utility companies. The interests of nearly all these inspectors are concerned as much with prevention of accidents as with prevention of fire. Up to a few years ago the only electrical rules were those of the National Electrical Code, which were designed primarily for fire prevention. Recognizing the need for rules to promote electrical safety, the Bureau of Standards undertook, after careful investigation and very many conferences, the drafting of the National Electrical Safety Code, which was published in November, 1916.

The question has recently been raised whether it is better to continue both these two codes or try to combine them into one for the benefit especially of the inspectors of municipalities who are under legal as well as moral responsibility to promote safety as well as prevention of fire. The Bureau of Standards has received requests from many municipalities to make an effort to combine the two codes for this purpose, and during the past year earnest work has been done on this as an experiment. B. H. Glover, of the Underwriters' Laboratories, and several engineers of the Bureau worked out a combination code of which copies were sent out to municipal authorities of the larger cities for opinions and criticism.

Before going further on this work it was desirable to have a number of questions answered, among these being: Is such a combined code needed? Will electrical inspectors use it? Is the present attempt at combining the codes suitable? Should effort be made to stick closely to the exact, present requirements or not only harmonize the rules but also revise them? Should this tentative combination code be finished and published? Speaking of the enforcement of the combined code, Dr. Lloyd said that the administrative difficulties will probably be no greater than to apply two separate codes, rather will these difficulties be diminished. He believes there will be little trouble from conflicts between the two original codes since there are but few conflicting requirements, and these deal chiefly with permissible alternatives that probably can be harmonized.

As now drafted in preliminary form the combined code rules relate only to the wiring of buildings. Part 3 of the N. E. S. C. is being combined with Class C rules of the N. E. C. Likewise, Part 1 of the N. E. S. C. could be combined with Class A or station rules of the N. E. C. The grouping and arrangement of the rules is quite different from that followed in either the safety or fire codes. An earnest effort was made to bring about a more logical arrangement. The subjects taken up in the different sections are substantially as follows: Scope and application; general rules as to protective features; rules on grounding; service entrances; roughing-in work on conduits, raceways, etc.; installation of wires and their protection; switches, cutouts and panelboards; lighting fixtures, including signs; heating devices; motors and motor applications; theaters, including motion-picture equipment; garages; wiring of circuits exceeding 750 volts; signal systems; generating and substations. The Class D rules of the N. E. C. have not been taken up yet but could readily be taken in bodily. The Class F rules on marine work have not been considered. Considerable freedom was taken in slight changes in the wording of the rules wherever clearness required it. In a few cases the requirements of the rules were slightly extended and in a few instances old rules of the fire code that have become obsolete and have practically never been enforced were dropped. No effort was made to adopt any new rules or radical innovations, as it was not considered the function to take up the matter at this time. Dr. Lloyd felt that this work should be left to the Electrical Committee of the National Fire Protection Association, which revises the National Electrical Code.

Thomas E. Barnum, of the Cutler-Hammer Manufacturing Co., presented some discussion on behalf of Arthur W. Berresford, vice-president of the company, who felt that there were some objections to adopting a combination code at the present time. First, there is a difference in theory between the safety code and the older code. Fire prevention can be definitely measured in dollars, whereas at the present time it is impossible to measure accident prevention in this way. Therefore, the tendency is to be much more strict regarding the latter. The N. E. C. contains specific rules evolved from long practice. When the N. E. S. C. is developed to similar definiteness, then it will be time to combine the two codes. It was felt information should be available as to the plan for revising the combined code and whether conferences will be held before revision is effected. Other questions arising are: Who will make the changes? Will the new code supplant the old codes? Will the Electrical Committee, N. F. P. A., disband? Are devices to be tested for both fire and accident by the same laboratory? Manufacturers are heartily in accord with the safety code. Many times, however, an installation can be made more safe while it is being put in instead of putting additional safety requirements into the apparatus itself. The matter needs much more study lest electrical devices be made much more expensive to the public. Therefore it was felt that at present it would be unwise to combine the two codes, but better to let them continue separate.

Replying to questions, Dr. Lloyd said that the Bureau of Standards has no administrative power to enforce any rules. It is in position only to help draft standard sets of rules with absolutely no commercial or personal interest involved. The results of its work must stand entirely on their merit. It is not planned that the present combined code will displace either the safety or the fire code.

Ben. Clark expressed the opinion of not only the Detroit but other municipal inspection departments that there was an urgent need of a combined code for municipalities. The Detroit local code included some 40 special safety rules that were not included in the N. E. C. He felt, as practically all municipal inspectors that he had consulted feel, that it would be best for all concerned to have a combination code. This would be a great help to the municipal inspector, to the contractor and to the journeyman.

V. H. Tousley, chief electrical inspector of Chicago, said he recognized the need for a combined code to municipal inspectors. He believed that this was the most important subject before the convention. He had found that many parts of the safety code were not worded definitely enough for practical application. Therefore, he felt that it would be desirable to go rather slowly before formally adopting this present combined code.

Dana Pierce said that there were two questions involved: First, is the utility of the combined code recognized? Second, is the present status of safety rules such that they can be included in a combined code? Speaking not as the chairman of the Electrical Committee, N. F. P. A., but giving his own personal opinion only, he felt that the answer to the first ques-

tion is "Yes" but to the second "No." Hundreds of questions are coming up as to the best practice in safety protection and in the proper wording of safety rules. Both manufacturing and operating companies are very doubtful as to the practicability of going too fast in combining the two codes.

On motion, the association decided not to go on record as favoring the present combined code.

At the conclusion of this session, William H. Blood, assistant to president, American International Shipbuilding Corporation, Philadelphia, presented a very interesting and profusely illustrated lecture on the building of and on the work being accomplished at the Hog Island shipyard, the largest in the world.

Wednesday Morning Session.

The Wednesday morning session was devoted to the reports of various committees punctuated with interesting talks by F. A. Barron and D. W. Ellyson of the General Electric Co. Mr. Barron spoke of the advantages of "Time Lag in Motor Protective Devices." The ordinary fuse has many disadvantages as a protection for smaller motors. In order to allow the heavy current required in starting motors or when heavy overloads are encountered these fuses must necessarily be considerably larger than the running requirements of the motor warrant. Therefore small continuous overloads which are more liable to damage the motor than extreme momentary overloads are not protected against. The advantages of a time-element feature which can be embodied in a fuse plug are evident. Mr. Barron then explained the features of the new plug recently perfected by the General Electric Co. and which contains this very desirable feature.

Mr. Ellyson described the features and advantages of the automatic substation with particular regard to its conservation features. These stations as used by various interurban traction companies have proven very successful, for in addition to the fact that no attendant is required, they are much quicker and more positive in action than the hand-operated station. These stations contain in addition to the transformer a synchronous converter and the auxiliary control apparatus. This control apparatus consists of a contact-making voltmeter which actuates, when certain limits are passed, the drum control by which the signals, starting apparatus for the connector and line connection switches are operated at the predetermined intervals. The machine is protected against dangerous overloads by three sets of grid resistances which are automatically put in series in the line and which limit the load on the machine to 150%. As this load would injure the machine if left on for any considerable length of time, a thermostat is mounted on the resistances which will cut off the apparatus after such a load has been on for about two hours. There are numerous other protective features to this equipment such as devices to prevent the machine from "running away" and for fixing the polarity of the equipment before connecting it to the line. All operating parts are interlocking to prevent the one operation from starting before the previous one is completed, but the failure of no single device will put the station out of service.

Report of Committee on Underground Systems.

F. F. Sengstock, of Chicago, read the report of the Committee on Underground Systems which contained much information of interest. The question of standardizing underground systems has never been widely discussed and the committee found many different methods in use, all of which lead to complicated data as regards service, cost of installation and repair. The committee investigated several different systems, and although all are in working condition at present, there is some doubt that the length of service of some of the systems will be satisfactory, but it is safe to say that others will stand up indefinitely under very severe conditions.

One of the most important findings was that the much mooted question of lead-sheathed cable for underground work is more or less overworked and its value overestimated. Although the lead sheathing is placed on the cable to prevent moisture reaching the insulation many breakdowns and blowouts have occurred where moisture has penetrated the lead. It is almost impossible to obtain a long run of cable in which the lead sheath is uniform throughout, and in putting in the cable mechanical injury, plus a certain amount of stretching, will tend to weaken the outer sheath. The insulations used under lead sheathing, such as rubber and cambric tape insulation, and in telephone and signal work, paper insulation, are always subject to this seepage of moisture and under these conditions no insulation, except rubber in the best of condition, will stand up, and even rubber will often deteriorate and break down in a short while. The committee found that cables, specially insulated, have given service for many years without breakdown, even when subject to a great deal of moisture and under conditions where strong alkaline waters and heavy traces of ammonia salts were present. Under these conditions it is safe to say that lead will not stand up.

Lead-sheathed cable made up and then steel-taped has been used extensively in park systems and for street lighting with fair success, but the question of placing this in the ground, where subject to alkaline water and ammonia salts, again shows it will break down. Considerable moisture having salt in solution has also broken down this combination.

The committee also presented several suggestions for construction of underground systems which were the result of very thorough investigation on this phase of the work.

Report of Committee on National Electrical Code.

The report of the Committee on National Electrical Code was presented by Chairman F. D. Varnam of St. Paul, Minn. The following recommendations for changes in or amendments to the Code were introduced:

1. Rule 70-d, paragraph 2. Strike out all words after "insulating material" in fourth line, and change to read as follows:

"There must be an air space of at least one inch between any enclosed fuse or current-carrying part and the door, unless the door is lined with an approved insulating material, when the air space must not be less than one-half inch."

An air space of ½ in. between current-conducting parts and metal doors is not considered sufficient, especially where large doors are used. Failures have been noted in such cases where this spacing has been used.

2. Rule 25-d. Omit the fine-print note after this rule and add the following:

"Must not be attached to lighting fixtures, but special outlets must be provided having an approved switch, plug connector and a red signal light which will plainly indicate when the switch is in the 'on' position."

3. Rule 8-c. Insert at the end of first paragraph after the words "is given in writing," the following:

"All switches used for this purpose must be of an approved

externally operated enclosed type arranged to completely enclose all bare current-conducting parts."

4. Rule 32-h. Change to read as follows:

* * * "Must where passing through metal covers of outlet boxes or similar fittings, be protected by approved bushings of insulating material designed for the purpose." * * *

This change is intended to prohibit the use of unbushed covers, and covers having metal bushings at such outlets.

5. Rule 59-c. Second paragraph. Change to read as follows:

* * * "Metal fittings including conduit outlet box covers designed for bringing conductors from metal conduit to exposed wiring must be provided with non-absorptive, non-combustible insulating bushings which, except with flexible cord, must separately insulate each conductor." * * *

6. Rule 59-b. Strike out the fine-print note and change to read as follows:

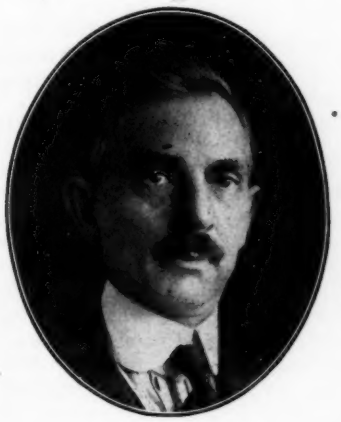
* * * "Must be well galvanized or otherwise properly coated inside and out with conductive material such as tin or zinc to prevent oxidation." * * *

7. Rule 28-d. Strike out the fine-print note at the end of this section and insert in its place the following, making the rule positive:

* * * "Outlet boxes and fittings having a conductive coating must be used in order to secure a good electrical contact at all points throughout the conduit system." * * *

After considerable discussion in which the questions were viewed from all angles, the association accepted the first, third, fourth and fifth recommendations. The second, which referred to outlets provided for flatirons, was rejected after it was demonstrated that such a rule would probably serve to increase the use of these appliances on fixtures not designed for them. The sixth and seventh were referred back to the committee for further consideration.

C. K. Cregier, President-Elect.



F. L. Lucas, Retiring President.

Wm. S. Boyd, Secretary and Treasurer.

Report of Committee on Electric Traction Systems.

The report of the Committee on Electric Traction Systems was presented by Frank R. Daniel, chairman of the committee. The following changes in Rule 41 of the National Electrical Code, governing the installation of wires in car houses, were advised:

Paragraph *A* to read, "All trolley wires inside of buildings shall be securely supported on insulating hangers attached to a wood troughing, which shall be not less than 12 inches in width, with side strips extending at least 2 inches below the bottom surface, and the whole painted with a moisture-repelling insulating paint."

Paragraph *C* to read, "Feed wire supplying current to the trolley wire shall have a carrying capacity sufficient that all cars on the longest track in the barn may be put into operation simultaneously without unduly over-heating the feed wire or injuring the insulation of same."

Previous to Section *E*, a note should be inserted recommending that power for light, heat and stationary motors be taken from a commercial light circuit, where possible, and installed in accordance with the requirements of the class.

The following should be added to Rule 40, Sec. *j* 1. "Sufficient capacity in lightning arresters should be provided, but not less than one arrester for each 1000 feet of track."

The committee also introduced for consideration the following suggestion covering the protection of trolley wires in car houses and yards which was brought up by Mr. Markel, a member of the committee.

That a line breaker be installed in each track trolley wire where entering car house, or at the point of divergence in car yards.

Each track trolley wire to be fed independently and controlled by an approved cut-out and jack-knife switch so arranged that each track trolley wire may be cut out independently of any other track.

Switches and cut-outs shall be grouped in a weatherproof cabinet located on outside of building in a readily accessible place.

It was pointed out that the adoption of such a rule would permit the rolling stock to be moved out of such houses in case of fire in some other section. The present rule requires all trolleys in houses to be controlled from one switch and in the event of a fire when such switch is opened it is impossible to remove the cars and other equipment then in the house. This and the other recommendations were referred to the Code Committee.

The report of the recently created Committee on Public Safety was read by W. S. Boyd in the absence of the chairman, F. O. Evertz. The committee realized that much of its work must be along educational lines as the matter of public safety is altogether psychological. Some improvements can be made in safety conditions, however, by improving electrical fittings in a manner which will be conducive to the best results obtainable under the present status of utilization. The manufacturer must be appealed to for such assistance as he may see fit to render. Municipal and state authorities should be approached, so that proper statutory regulations may be adopted, which will make mandatory, safety measures for those who of themselves will not otherwise protect life and property.

The National Government has published several circulars which have been adopted by a number of safety commissions in their respective states, but there

has not been any concerted action taken by anyone to center on a certain set of standards, and see that they are given a tryout. It was recommended that should Western Association of Electrical Inspectors get back of one set of rules, for example, Circular 54 of the United States Bureau of Standards, and each inspector endeavor to have this circular adopted by his respective municipality or state, and influence the Board of Education in his respective district to devote some time to the reading of its contents in the classes conducted in their various schools.

The committee also suggested that immediate practical results could be obtained through a more rigid observance, by the inspectors, of Rule 15A of the National Electrical Code, as the grounding of primaries and secondaries is a prime safety factor, and often insufficient attention is given to the grounding of conduit, surface raceway or armored cable systems. The grounding of motors and metal cases for enclosure of electrical apparatus is sometimes entirely lost sight of. Every inspector was urged, therefore, to give this portion of the National Electrical Code the closest scrutiny and ascertain if he has been negligent in enforcing any portion of this very important feature.

In addition, open knife switches or cutouts should not be tolerated and safety switches should be used where practicable, and when these cannot be used, enclosures having a self-closing door, preferably under lock and key, should be substituted. Dead-front panelboards can be used to great advantage in numerous locations where the least liability of moisture exists, or the grounding of the human body is possible. Open cleat receptacles, or rosettes, installed on low basement ceilings should be immediately condemned.

Report of Committee on Demand Factor.

The report of the Committee on Demand Factor was presented by Chairman G. W. See of Minneapolis, Minn., and brought out the relation of the demand factor to the connected load on a wide variety of installations. These demand factors vary considerably in the different installations, apartment houses showing a demand factor of from 32 to 40%, theaters about 22%, ice manufacturers 77%, department stores 59%, printing shops 50%, shipyards from 60.5 to 77%, foundries and iron works from 60 to 100%. As these demand factors are based on the connected load only, they only effect the main feed wires which form such a small portion of the total wiring that the saving, if they were adopted, would not be very great. The compilation of demand factors governing the demand of sub-feeders is, of course, very broad and the committee requested that the entire association co-operate with them in determining these factors. It was pointed out that the aid of the central-station companies, the Electric Power Club and National Electric Light Association might prove very useful and the members were further asked to attempt to secure this help.

The discussion which followed the presentation of this paper brought out the fact that in many cities the inspection authorities had been paying considerable attention to this question and had adopted methods which would allow such demand factors to be taken into consideration, although no set rules had been drawn up. For example, in several places ranges, welders, cranes, elevators and similar installation had been made basing the size of the copper conductors on the demand factor rather than on the connected load and no trouble has yet risen from such installations.

V. H. Tousley, of Chicago, then explained that in determining such demand factors three factors must be considered. First, the demand; second, the heating of the conductors, and third, the application. He pointed out that in a series of tests which have recently been completed it was found that for many installations where the load was of an intermittent character, a load of twice the size as that permitted in the Code rules might be applied without any deteriorating effect on either the copper or the insulation. It was further pointed out that the accurate determination of such factors which would permit their being adopted by the Code would be of inestimable value to the entire field and the members were urged to apply themselves to this work that this might be accomplished.

Report of Committee on Construction and Installation of Electric Signs.

This committee, the report of which was read by Oscar M. Frykman, chairman, recommended the enforcing of a rule requiring that the feed wires for signs be entirely in conduit. It was pointed out that present practice, permitted in many places, of allowing a short open run between the termination of the conduit and the sign was inadequate. That such a rule would not work any severe hardships on the manufacturer, contractor or public was shown from the fact that several cities had had such rules in effect for some time and no evil effects were apparent.

Other Committee Reports.

The reports of the Committee on the Installation and Operation of Induction Motors and the Committee on Rubber-Covered Wire presented by K. W. Adkins and Victor H. Tousley, respectively, were very interesting and contain much information of value to the entire field. The reports of these committees, together with an address by A. R. Small, of Chicago, on the contemplated changes by wire manufacturers, together with a brief summary of other inspectors' problems will be reproduced in an early issue of the Electrical Review.

Visit to Underwriters' Laboratories and Banquet.

On Wednesday afternoon the members visited the Underwriters' Laboratories, where a number of tests on electrical equipment and a fire test on wired glass windows were made.

In the evening a complimentary banquet was tendered the members at the Morrison Hotel by the different electrical interests of Chicago. This banquet was one of the best attended banquets held by the industry in Chicago and considerable praise was given to the Entertainment Committee for the delightful manner in which it was arranged and carried out. Thursday noon the members attended the weekly luncheon of The Electric Club of Chicago.

Election of Officers.

The election of officers resulted in the following being selected for the ensuing year: President, C. K. Cregier, Chicago; first vice-president, K. W. Adkins, Kansas City, Mo.; second vice-president, O. M. Frykman, Minneapolis; William S. Boyd, of Chicago, was re-elected secretary and treasurer. The executive committee was appointed as follows: K. W. Adkins, C. K. Cregier, O. M. Frykman, J. W. Strub, F. G. Waldenfels, W. B. Doss, Chas. Stewart, and R. H. Robinson.

Editorial Comment

A Simple High-Voltage Hydroelectric Plant

THE HYDROELECTRIC development, the salient features of which are described in this issue, is a very interesting one. It represents many innovations in hydroelectric development that might be adopted under similar circumstances elsewhere, and that might enhance the value of such potential developments. The initial development is also the ultimate development, and utilizes to the full the water power available. This development is also the largest in Michigan, a state in which hydroelectric developments have been prosecuted and interconnected to a pleasing extent to form a flexible and co-ordinated whole.

The Junction Development of the Consumers' Power Co. on the Manistee river is essentially a long-distance, high-voltage proposition, the site of the power house being about 100 miles distant from the market for the energy generated. The voltage actually used is among the highest commercially employed, to wit, 140,000 volts. Another fact that places this installation somewhat out of the ordinary in these times of using 60 cycles as the standard is that the periodicity of the generators is 30 cycles. The water power at the site is fully developed. The turbines have been selected so that one unit is able to utilize to the full the water flow of the Manistee river at low-water level, while all three of the 7500 hp. turbines are able to use the water available under normal conditions. Such an arrangement is at once flexible and efficient.

The electrical lay-out is extremely simple and straightforward. The generator conductors are routed in a direct path to the transformers, which are installed outdoors. The switchboard, which controls generators, turbine penstock and spillway gates, and the outgoing transmission line is located at the end of the generator room between the generators and the outdoor substation. As the power plant is but one of a number feeding into a common network operated by the Consumers' Power Co., duplication of equipment was not considered justified, as it may be when dependence is placed upon a single source of power. The generators are protected by overload relays only during such time is the synchroscope is in circuit, that is while a unit is in process of being placed on the bus. At other times dependence is placed upon the operator to cut away a machine should a short-circuit occur, the long distance of transmission, 101 miles, the reactance of the transmission line, the transformers, and the synchronous reactance of the slow-speed generators themselves being depended upon at other times to give sufficient protection to the generators until the operator is able to cut the machines away from their load.

Far-removed from the facilities of the city and the labor markets, special attention has been given ease of maintenance and repairs. The transformers can easily and quickly be connected in open-delta so as to permit two units to carry the load while the third unit is *hors de combat*. Any of the three 5000 kv-a. 140,000-volt oil-cooled transformers may be moved from its normal position and pushed on to the generator floor, let down into a transformer pit and have its core removed by a crane without any difficulty. This crane also may be used for handling the generator and turbine runners and shafts. In other less spectacular ways manual effort has been reduced. For example, turbine and spillway gates are motor driven. A pumping outfit is installed for removing oil from transformers and oil circuit-breakers without any special human exertion. An oil-filtering and renovating outfit is available for use of the power house force. And similar labor and time-saving features abound.

The Junction Development represents an extremely simple yet flexible hydroelectric development that answers its special purpose eminently well. Unnecessary additions and complications have been avoided, and the installation is the better and its cost the lower. If many of the water powers now running to waste are to be harnessed, and their utilization not to be handicapped by excessive fixed charges, the lay-out of Junction Dam might be studied with advantage by those in whose power it rests to develop and turn to use our vast and valuable water powers.

Electric Lighting in Middle-Class Homes

ELSEWHERE in this issue Mr. Luckiesh discusses electric lighting of middle-class homes, a subject of great importance esthetically, socially and commercially, for the reason that the major portion of residential lighting is that of the middle-class homes. Lighting in the home should be artistic, it should be economical, and it should be scientific. Middle-class householders cannot usually afford expert lighting assistance, hence place their reliance upon the fixture dealers to give them artistic illumination and lighting fixtures. The result is that in so many instances illumination in the home is neither scientific, efficient, artistic or satisfactory and only mediocre.

The remedy is to educate electric fixture dealers, architects and landlords in the ways and fundamentals of artistic and scientific lighting of the home, to

attain which attention to the wiring as well as location of the fixtures is needed. Mr. Luckiesh outlines various aspects of this matter in his article entitled, "Lighting a Middle-Class Home."

The housewife can ordinarily bring about coziness and the feeling of comfort in her home by the hanging of draperies, choice of color, selection of furniture pleasingly arrayed. But the choice of lighting units and flexibility of their arrangement is in most cases a matter beyond the control of the householder. In using electricity in the home for power as well as lighting, the householder too often finds that lack of outlets, absence of outlets where wanted, and inflexible wiring combine to create awkward situations, interfere with the desired result, and act as discouraging deterrents in allowing wider adoption of things electrical. Mr. Luckiesh makes a strong plea for the wider use of the mobile or portable lighting fixture and fixtures that can be moved from time to time, so as to relieve monotony and create a change. And the first thing toward this end is the presence of judiciously placed outlets.

Occasional re-arrangement of rooms relieves monotony, gives play to imagination and offers scope for improvement and change. Ability to move the lighting "fixtures" enhances instead of hinders this re-arrangement of the household. Fixtures that may be moved, to outlets available, fits into the scheme of things; a house so wired lends itself to artistic and scientific lighting. In some states a fixture installed by a tenant automatically becomes the property of the landlord. A generous supply of outlets installed by the landlord and portable fixtures owned by the tenant have their further advantages in this case.

Flexibility of lighting—portable lamps, wall brackets and ceiling fixtures—may or may not be used, according to mood and occasion. But outlets for them must be made available if home lighting is to develop in a way its possibilities and its influence deserve. And what applies to outlets for lighting applies equally to outlets for domestic power. Electricity in the home, with all its possibilities, will continue to be handicapped so long as the residential load is stinted if not asphyxiated by insufficient outlets.

Capitalizing Coal Saving

RECENTLY the Geological Survey made a statement that will, when it is better known, cause a furore in the United States. That statement was simply that in 1916 the average value of coal at the mine was $1.32 per ton, while in 1917 it was $2.25. That is an increase of 93 cents or 70% per ton. The value of the coal at point of consumption is, of course, higher, because including the cost of transportation, which has also been subject to considerable increase within the last year or so.

We want everybody who burns coal or who in any way is affected by the price of coal—and that includes everyone—to appreciate what this increase in price means. It means that anything requiring coal in its production has suffered a pro rata increase in cost or that the profit has declined an amount pro rated from the increase in coal cost.

Coal at $1.32 per ton was too cheap for the average user to concern himself very seriously about saving it. The price was too low to offer any real inducement to practice any but the simplest economies. Even at $2.25 per ton it hardly pays any except the larger users to install equipment to burn it with highest economy. At $4 per ton, which is lower than coal ordinarily is after transportation is paid, the problem is different and the higher the price the greater becomes the incentive to save money by saving coal. However, for the power plant that operates eight hours a day and more, it is especially worth while endeavoring to obtain 40% instead of anywhere from 7% and upward of the heat value from the coal purchased. Coal is still sufficiently high in price, either at the mine or delivered, to encourage the use of coal-saving methods and equipment.

At reigning coal prices coal-saving equipment is able to pay for itself within a year in the plant that operates 12 out of the 24 hours, with a corresponding gain the longer the hours of operation. Such an investment is obviously a sound one, and the sooner made the sooner it pays for itself and commences to be clear profit.

Making the Fan More Useful

FANS are beginning to be recognized as appliances that may be used to good purpose all the year round instead of but seasonally, as was once and still is to too great an extent, the impression. The fan is not a seasonal appliance; it is an all-the-year-round appliance.

Used primarily for cooling purposes for promoting personal comfort in the summer months when temperature and humidity are high, the fan became popular in all walks of life. Its effectiveness and general application during the summer tended to mask its other applications at other times of the year. That these other applications may be better understood and more widely adopted, it will be necessary for the manufacturers of fans, the central-station companies and similar interests; to preach the economy, the effectiveness and all-round usefulness of the fan.

The creation of personal comfort, promotion of health and maintenance of human efficiency during the summer by the electric fan are too well known to need further mention. The fan, and the agitation of air, in hospitals, a more specialized application of the above, has been proved to be an accelerating influence toward convalescence. In the winter the fan may be used to advantage to equalize room temperatures, saving fuel, encouraging health, for hastening the drying of laundry, for cooling, for removing odors, for fruit drying, and so on. Preach the gospel of making the fan more useful.

Week's Events

N.E.L.A. Restored to Normal Basis—Suggested Changes for Jovian Order—Additional Central-Station Statistics

NATIONAL ELECTRIC LIGHT ASSOCIATION RESUMES NORMAL ACTIVITIES.

War-Time Activities Turning to Those of Pre-War Times—Promise of Big Convention.

At the January meeting of the National Executive Committee of the National Electric Light Association in New York important matters relating to the Association and its future activities were taken up. There were present: W. F. Wells, president; H. C. Abell, W. H. Atkins, M. R. Bump, J. E. Davidson, C. D. Flanigan, P. G. Gossler, A. Monro Grier, Martin J. Insull, Paul Jones, George B. Leland, John W. Lieb, E. W. Lloyd, D. H. McDougall, E. S. Mansfield, J. E. Moore, representing R. J. McClelland; Walter Neumuller, C. J. Russell, F. W. Smith, Paul Spencer, Thomas Sproule, T. C. Martin, secretary; S. A. Sewall, assistant to secretary; W. C. Anderson, statistical secretary; A. J. Marshall, secretary Electric Vehicle Section; Messrs. F. A. Birch and E. A. Baily by invitation.

Treasurer Smith presented an abstract of the financial statement for the five months ending Nov. 30, 1918, showing cash on hand June 30, of $78,586.69, receipts during the period $28,083.25, or a total of $106,669.94; disbursements $72,091.96; leaving cash on hand, Nov. 30, amounting to $34,577.98. Mr. Smith also stated that in accordance with recommendation of the finance committee, the Association had purchased bonds of the Fourth Liberty Loan to the extent of $20,000, and asked for the approval of the executive committee.

Chairman Neumuller of the Membership Committee reported a membership at the close of 1918 of 10,111 members. He also stated that a campaign has been prepared for increasing company membership.

At the suggestion of President Wells a resolution regarding re-employment of soldiers was adopted, a copy of which has been sent to all member companies, Department of Labor, etc.

Mr. Wells informed the committee of the recommendation of the Public Policy Committee that all committee work be resumed and that the 1919 convention be planned along pre-war lines as nearly as practicable under present conditions.

On motion it was voted that all committee work be resumed; that the convention be planned along pre-war lines, and that the question of the time and place of the convention be left to the president with power.

The following resolution, read by Secretary Martin, was adopted:

Resolved, that in order to assist the men who have received their discharges from Government service, in securing suitable employment and to aid the member companies of this Association in obtaining the services of such individuals, the secretary be and hereby is authorized and instructed to maintain at headquarters a record showing the qualifications of available men as filed by themselves, who are able to fill executive, administrative and supervisory positions with member companies of this Association; and that he print a notice in the Bulletin stating that such record is available for use of member companies upon application.

Chairman Russell of the Commercial Section reported that his Executive Committee had met on Jan. 9 and had received reports from practically all bureaus, committees and sub-committees, and that it was the opinion of the Section that in spite of the present condition of possible depression in business which may be anticipated for the next five or six months, the Section should resume activities, with judgment, as soon as possible. The Executive Committee of the Section had also determined which committees would have new ideas to present in the form of reports or papers should the Main Executive Committee decide to hold a post-war convention.

Chairman McClelland, of the Technical Section, was unable to be present, but had submitted a written report which Secretary Martin presented. The report stated that the standing committee had been organized and when so instructed would proceed with active committee work. The report also outlined the scope of the work of the various committees and offered the co-operation of the Technical Section in any policy the Association might decide upon in getting more closely in touch with the electro-chemical situation, suggesting that any such work undertaken should be in co-operation with the Commercial Section.

President Wells explained that the suggestion regarding the electro-chemical situation had been brought to him by Past-President Lloyd, and Mr. Lloyd added that he felt the Technical and Commercial Sections should investigate and tie in with the legitimate activity of the electro-chemical industry, and that the part of the central stations up to now had been merely to supply energy at the lowest possible rate. He also suggested that the Exhibition Committee endeavor to get the manufacturers of machinery used in that industry to exhibit at the convention.

For the Accounting Section, Chairman Jones reported that one meeting of his Executive Committee had been held, that all committees were in good shape to take up the activities that are now authorized, and that three of the committees have recently been rather active. He referred to the work of the Committee on Relations with Commissions in endeavoring to reduce the demands of the commissions on member companies, in so far as accounting matters are concerned, and stated that very satisfactory letters have been received from a number of the commissions, which in turn have been transmitted to the member companies. Mr. Jones also spoke of the activities of the Educational Committee in increasing the number of scholars enrolled in the correspondence courses, and asked for an appropriation which was granted for the preparation of the courses. He also referred to the work done by the Accounting Efficiency Com-

mittee at the request of the War Industries Board in the conservation of paper.

Chairman Mansfield of the Electric Vehicle Section presented the report of said Section, with various recommendations as to educational and other work which might be undertaken. After some discussion it was voted to appropriate $2500 for the work of the year to further the sale and introduction of electric vehicles in such manner as in the opinion of the Section Executive Committee might be deemed to be best.

CEDARMEN HOLD IMPORTANT ANNUAL MEETING.

Twenty-third Annual Gathering at Minneapolis Considers Vital Problems of the Business.

Important matters of deep concern to the cedar lumbering industry were considered at the 23rd annual convention of the Northern White Cedar Association which was held at the Hotel Radisson, Minneapolis, Minn., on Jan. 21 and 22. Representatives of 24 member companies were present when President Gerich opened the meeting and read his annual address. He reviewed the general business conditions of the past year and commented on the prospects of the immediate future, which he regarded as very favorable to the cedar industry. The growing use of steel and iron posts was alluded to as worthy of consideration in planning more advertising of the advantages of cedar posts. Mr. Gerich praised the work of the secretary and of the various committees.

Secretary Boucher presented his report in which he dwelt at length on the work of the Railroad Committee. This body took prompt action to represent the association at numerous conferences relative to traffic matters. The work of other committees was also reviewed, especially those dealing with publicity and welfare, insurance and advertising. The other activities of the secretary's office were also reviewed. Treasurer Thomas, of Manistique reported finances in good condition.

The report of the Insurance Committee was discussed in considerable detail, this hinging chiefly on how the high cost of liability insurance could be reduced. Drastic requirements of compensation laws were largely responsible. Mr. Gilkey discussed the pole situation, which is not as favorable as is desirable, a shortage in the estimated production being probable due to unfavorable weather. B. Finch discussed the situation as to railroad ties. Mr. Berger explained the pulpwood situation.

At the opening of the second day's session the report of the Advertising Committee was presented; the recommendation to continue pole advertising was approved. More intensive pole advertising was decided on.

The election of officers resulted in the choice of the following:

L. L. Hill, of Page & Hill Co., Minneapolis, president; L. A. Furlong, Minneapolis, vice-president; W. B. Thomas, Manistique, and N. E. Boucher, Minneapolis, were re-elected treasurer and secretary, respectively. Ben Finch, of Duluth, and M. J. Bell, Minneapolis, were elected directors for two years.

L. L. Hill, president-elect of the Northern White Cedar Association, is one of the most popular men in the cedar business. For a number of years he has been actively engaged in the cedar-pole business, being a member of the firm of Page & Hill Co., Minneapolis, Minn., one of the largest of the cedar-pole producers. Mr. Hill has been a tireless worker in the interests of the association and his efforts have made him popular not alone among the users of poles but with his competitors as well. He

L. L. Hill, President-Elect Northern White Cedar Association.

is deserving of the new honor conferred on him and it goes without saying that he will prove to be one of the most aggressive and constructive presidents the Northern White Cedar Association has ever had.

IMPORTANT CHANGES SUGGESTED FOR JOVIAN ORDER.

St. Louis League Adopts New Program—National Cabinet Approves Plan.

At a meeting of the St. Louis Jovian League held in St. Louis on Jan. 16, the following plan, involving numerous important changes in the organization and operation of the Jovian Order were adopted. On the following day at a meeting of Jupiter's Cabinet, the plan was approved in substance and a resolution passed recommending its adoption by the Jovian Order as soon as the necessary steps could be taken legally under the Jovian constitution. Those attending the cabinet meeting were Martin J. Insull, W. B. Head, H. J. Pettengill, L. O. Ripley and J. F. Strickland.

The plan is as follows:

That the name of the St. Louis Jovian League be immediately changed to that of "St. Louis Electrical Board of Trade," with the addition later, if changes in the parent Jovian body make it advisable, of the words, "Affiliated with International Electrical Board of Trade."

That the League retain its charter with The Jovian Order in any event until the suggestions herein made have been passed upon by the Order.

That the object, purpose and procedure of the St. Louis Electrical Board of Trade, as laid down in its Constitution and By-Laws, be reframed in harmony with the business aims that name implies, by a Reconstruction Committee named by the president, to be later adopted, or amended, by a majority vote of the members of the St. Louis Electrical Board of Trade.

That all desirable social and other activities now present in the St. Louis Jovian League be retained in the St. Louis Electrical Board of Trade.

That the Reconstruction Committee prepare and forward to the St. Louis Chamber of Commerce a statement of the change in the status and name of the present League, and the assurance that it is not intended to duplicate or interfere with the work of the Chamber.

That the annual dues of individual members of the St. Louis Electrical Board of Trade shall be established in accord with four classes of membership, as follows: Active, $2; Contributing, $5; Sustaining, $10; Patron, $20.

That the selection of his class of membership be placed

entirely and solely within the discretion of each individual member.

That upon the dues invoice sent each member shall be enumerated all classes of membership and the amount applicable to each class. Each member, of his own judgment based, we assume, upon his position in the industry, his ability to pay, the importance of his interests and of the investments which he desires to promote and protect, will make his choice and remit accordingly.

The thought here is that of relieving the younger, more active members from the heavier cost of membership; of placing the minimum fee at such a nominal figure as to make possible the securing and holding of a vast membership, at the same time providing against a serious loss of revenue by permitting those who reap the greater benefit to pay in just proportion thereto.

That each class of membership shall carry the same rights and privileges as all other classes.

That the president of the St. Louis Electrical Board of Trade appoint a Plan and Finance Committee, who, with the assistance of the Reconstruction Committee, shall formulate a plan, and put it into effect, to create Underwriting (Company) Memberships in the St. Louis Electrical Board of Trade with contribution pledges covering monthly payments for a period of two years, of an aggregate of not less than $1250 each month, first payment to be made upon call by the president following the completion of the work of the committee.

That a Committee on Secretary-Manager be appointed by the president of the St. Louis Electrical Board of Trade to work coincidently with the Plan and Finance Committee, to negotiate with a man capable of satisfactorily filling the salaried office of Secretary-Manager of the St. Louis Electrical Board of Trade.

That upon the completion of the Underwriting pledges and negotiations for a qualified man, the latter shall be employed, a down-town office shall be secured and equipped, and this equipment and force immediately proceed toward the accomplishment of the practical results for the local industry enumerated by the Plan and Finance Committee, with such additions as are from time to time deemed advisable.

That the Constitution, as reframed by the Reconstruction Committee and adopted by the members of the St. Louis Electrical Board of Trade, provide that the employment of the Secretary-Manager, the amount of compensation paid him, and all other matters pertaining to the expenditure of funds and the policy and activities of the St. Louis Electrical Board of Trade shall be subject to the decisions of an Executive Committee.

That the Executive Committee shall be elected by the individual members of the St. Louis Electrical Board of Trade and shall include one member from each of the recognized groups or branches of the electrical industry, and one member at large.

That the payment of dues to the St. Louis Electrical Board of Trade, by individual members as hereinbefore set forth in Paragraphs 26 to 30, inclusive, shall also provide each such individual, without any additional payment by him, with membership in an International Electrical Board of Trade on the basis and as otherwise hereinafter planned, in the event those plans are carried out by the Jovian parent body.

That the Reconstruction Committee frame and send to all other local electrical leagues, Jovian or otherwise, throughout the United States and Canada, a statement, following as nearly as desired the general content of this document, with an outline of the changes made in the St. Louis situation, a request that in each League a Committee be appointed to consult with the St. Louis Committee with a view to adopting similar measures, and with the further view of petitioning The Jovian Order in harmony with the suggestions here following:

That the Reconstruction Committee draw up and forward to the officers of The Jovian Order a petition, as representing the sentiment of the St. Louis Electrical Board of Trade. That this petition set forth this document in whole or in part, as deemed best, the improvement in the situation in St. Louis incident to the changes made, the results obtained and those within reasonable and early expectation of accomplishment, an affirmation of belief in the great possibilities inherent within The Jovian Order, provided that certain modifications are effected therein, a statement of the desire of the St. Louis Electrical Board of Trade to retain its affiliation with the parent body, and suggestions embodying an enlargement of the following skeleton outline of the changes believed necessary in the present Jovian organization and plan:

That the name of The Jovian Order be changed to that of "International Electrical Board of Trade."

That the organization, policy, plan of action and objects and purposes of the International Electrical Board of Trade be so framed, by a revision of the existing Jovian Constitution, that they will be in complete harmony with all that the name implies.

That the suggested revision of the Jovian Constitution shall be prepared by a "Committee on Constitution" appointed by Jupiter's Cabinet, who shall before drafting such revision carefully survey the organization plans under which are now operating in other channels bodies similar to that of the contemplated International Electrical Board of Trade; as examples, the United States Chamber of Commerce, and the International Association of Rotary Clubs.

That the Committee on Constitution (or a separate committee appointed by Jupiter's Cabinet) shall also survey the needs of the electrical industry (with relation to the possibilities for service, to meet those needs, inherent within such an organization as outlined here), and shall prepare a Standard of Performance for the International Electrical Board of Trade, which shall include in specific detail the proposed activities of the International Board, and a Budget covering the cost of operation for its first year, and which if accomplished by the International Board will justify for it a continuance of necessary support from individual members, local Boards and the electrical industry as a whole.

That the following suggested activities for the International Board be carefully analyzed by the Committee and included, in the practical detail of their application, in the Standard of Performance, if they are found to be sound and feasible:

1. Public relations.
2. Relations between employer and employe.
3. Trade ethics.
4. Electrical merchandising.
5. Community advertising.
6. Salaried field representatives.
7. Trade data.
8. Foreign Trade Bureau.
9. Inter-relations between electrical associations (hereinafter more definitely outlined).
10. Educational Speakers' Bureau (a corps of capable men to address monthly evening meetings of local Boards).
11. Employment Bureau.
12. A monthly publication.
13. Accident and health insurance.
14. Electrical expositions (possibility of traveling exhibits).
15. The Henry L. Doherty plan for the "Conservation of Human Energy."

That the revised Constitution and Standard of Performance be presented for the consideration of and action by a Special Meeting of The Jovian Order, called for the earliest date consistent with the requirements of the present Jovian Constitution.

That the revised Constitution provide practical means to permit of two classes of individual memberships, to wit: One class of members who are also members of local Electrical Boards of Trade and whose duties to the International Board will therefore be paid by such local Boards, as hereinafter noted; the other class, individuals who are not members of any local Boards and who shall pay dues direct to the International Board, on the same membership classifications as outlined for local Board dues in Paragraphs 26 to 28, inclusive.

That both classes of individual members in the International Board shall enjoy equal rights in so far as they deal in a direct line with the International Board, including the holding of International Membership Credentials inviting the enjoyment of the courtesy of visitors' privileges in all local Boards.

That the fundamental scheme of organization as now existing in The Jovian Order be retained—to repeat, that of a vast individual membership whose interests and efforts are held in and invested by a great chain of local chapters, clearing through a Central Body, which shall have advisory and in proper measure supervisory powers in those matters affecting all local chapters.

That the ideal development shall not fall short of an individual membership of not less than 100,000 desirable, eligible men, working with and through local chapters established in every city and town capable of supporting an active electrical organization, no matter how small it may be.

That all of the present useful activities of The Jovian Order be continued in this evolution of that body; for this plan shall not in any sense be construed as destructive, but in every respect a constructive building upon the excellent foundation heretofore created through years of earnest Jovian endeavor.

That to emphasize the suggestion that one of the major activities of the International Electrical Board of Trade shall be the inter-relations between electrical associations, attention be called to the following:

There are vital problems in the internal affairs of the Manufacturing, Jobbing, Contracting, Utility and other branches of the industry, each of which interest only indirectly the other branches, in which those other branches could be of small assistance, and which are capably handled by the separate associations maintained by those groups.

Also, there exist questions of great moment to all branches, to the entire industry, which should be acted upon by all associations as a unit with standardized policies and methods, to insure harmony, effective results and avoidance of a duplication of effort; there is non-existent today for such united effort any vehicle completely meeting the need.

As one example of the usefulness of such an agency may be cited a destructive condition generally considered as the problem of the public utility alone, but which in reality strikes at the heart of the earning power of every man drawing his income from the field of electricity. This condition is that of the feeling and expression of criticism, suspicion and resentment manifested by press and public in far too many communities and one of the most potent sources of trouble in the industry. It operates directly and indirectly against progress and growth of utilities by inciting unfair, restrictive legislation, cutting down revenue and making necessary capital wary and difficult.

That to remedy that condition should be the fight of every electrical man and association is surely obvious, because, when Central Stations, and Street Railways, and Telephone and Telegraph Companies, the great purchasers of electrical apparatus and supplies, are expanding and prospering, then all down the line, in every branch of the industry, "Business is good." Quite the reverse when the utilities are harassed and depressed to the point of stagnation and retrenchment.

In a great majority, if not in all instances, public distrust is the result of gross ignorance of the policies, basis of earnings, methods of operation, ideals and official personnel of utilities.

The remedy for ignorance is education. Therefore, the whole electrical industry, each man in it, through a standardized, far-reaching plan of action adopted by all electrical associations, should be saturated with educational, preventive and protective propaganda to be by him spread broadcast to the public by every possible means.

This is only one example of the need for a clearing-house for electrical associations; there are many more.

To supply in a satisfactory manner the required agency it is suggested that the revision of the Jovian Constitution provide that there be nominated and elected (in a democratic manner representative of all individual members) as the controlling body of the International Electrical Board of Trade, what will be in effect and possibly in name a Board of Directors, in which shall be included three members selected from each association maintained by each of the recognized groups or branches of the industry, chosen with the approval and co-operation of the respective associations. There shall also be included in this governing body one or more members-at-large, and such other members as a thorough study of the plan suggests.

This plan not only furnishes the common ground of contact for all associations, but fairly places in the hands of each branch its share of the control of the International Board, which draws its support from the entire industry.

That the International Electrical Board of Trade be financed by the dues of individual members paid direct to it by those members who are not also members of any local Board; also, by payments made quarterly or semi-annually by each local Board, the amount based on a per capita tax for each member of such Board, this payment to constitute payment in full for membership of both the local Board and each of its members in the International Board.

That the per capita tax for the first year shall be in the sum of $2; at the expiration of that period the tax to remain at $2 or be increased or decreased in harmony with the quality and extent of the service rendered by the International Board, the cost of that service and the gross revenue of the International Body.

That the matters covered herein and as enlarged and made more definite through the procedure and committees recommended, be submitted as a complete plan, capable of supplying a greatly needed instrument, to the more important electrical interests by Jupiter's Cabinet or a Committee named by the Cabinet, with the request that those interests immediately underwrite payment for a sufficient number of individual memberships to finance the International Board during the period in which the plans are being put into effect; these underwriting payments to be repaid in the event and when this reorganization project shall be established on a self-supporting basis.

That the St. Louis Electrical Board of Trade in furtherance of this program, as evidence of complete confidence in its success and that The Jovian Order may be perpetuated on a greater scale, will guarantee to the International Board the payment of a per capita tax of $2 each upon not less than 1000 members for the first year; the total sum of $2000 thus represented to be available for the purposes of the International Board immediately upon the adoption by The Jovian Order of the reconstruction ideas included in this document.

ADDITIONAL STATISTICS ON CENTRAL-STATION CENSUS.

New Hampshire, Colorado, Virginia, Delaware, District of Columbia and Maryland Show Gains.

Further preliminary figures of the forthcoming quinquennial report on the central electric light and power stations of the states of New Hampshire, Colorado, Virginia and Delaware, District of Columbia and Maryland have been given out by Director Sam. L. Rogers, of the Bureau of Census, Department of Commerce. They were prepared under the supervision of Eugene F. Hartley, chief statistician for manufactures.

The statistics relate to the years ending Dec. 31, 1917, 1912 and 1907, and cover both commercial and municipal plants. They do not, however, cover electric plants operated by factories, hotels, etc., which generate current for their own consumption; those operated by the Federal Government and state institutions, and those that were idle or in course of construction. A previous report covering the states of Arizona, Rhode Island, Connecticut and Wyoming was published in the Jan. 4 issue of the ELECTRICAL REVIEW.

The figures for New Hampshire show substantial gains for each of the two five-year periods for which statistics are presented, although the increases are somewhat greater for the 1907-1912 period. From 1912 to 1917 there was an increase of $941,666, or 40.4%, in the total income, compared with a gain of $905,918, or 63.7%, from 1907 to 1912. The total horsepower, which increased 80% from 1907 to 1912, shows a gain of only 10.8% from 1912 to 1917. The kilowatt capacity of the dynamos shows corresponding increases, 81% and 13.5%, respectively. From 1912 to 1917 the output of stations increased 33,862,253 kw-h., or 26.7%, compared with a gain of 71,335,049 kw-h., or 129.1%, from 1907 to 1912. There was a great decrease in the use of arc lamps for street lighting, together with a decided increase in the incandescents, etc.

The figures are shown in detail in the accompanying table.

A noticeable feature of the statistics for Delaware, District of Columbia and Maryland is the steady increase in the capacity of the steam engines and turbines used. The average horsepower per unit increased from 565 in 1907 to 997 in 1912, and to 2702 in 1917. This feature is given added significance in the fact that 97.9% of the total power is generated from steam.

In all important details the figures presented for Colorado show marked increases from 1912 to 1917. The decrease in the number of establishments since 1912 is due to the facts that 17 establishments which were reported separately for 1912 were combined and

reported as two establishments for 1917; that three establishments that were operated in 1912 were not in operation in 1917; and that the statistics for one establishment reported separately for 1912 are included in the street railway report, instead of the report on light and power stations, for 1917. These decreases are offset in large part by the fact that the present report presents statistics for 15 plants that have been built since 1912. The net decrease is wholly in commercial plants, the municipal plants showing an increase of five from 1912 to 1917.

Very substantial increases in Virginia are shown in all details except the number of arc street lamps. From 1912 to 1917 the income increased $1,612,064, or 200.2%, as compared with an increase of $414,394, or 106.1%, from 1907 to 1912. The expenses show similar increases, that for the five-year period, 1912 to 1917, being 267.4% and that from 1907 to 1912, 116.8%.

CENTRAL-STATION STATISTICS FOR COLORADO.

	1917.	1912.	1907.	Per cent of increase.[1] 1907 to 1917.	1912 to 1917.
Number of establishments	69	73	56	23.2	—5.5
Commercial	53	62	49	8.2	—14.5
Municipal	16	11	7	128.6	45.5
Income	$6,364,534	$4,791,340	$3,410,240	86.6	32.8
Electrical service.	$6,201,865	$4,626,693	$3,317,844	86.9	34.0
All other	$ 162,669	$ 164,647	$ 92,396	76.1	—1.2
Total expenses, including salaries and wages	$4,960,727	$3,997,760	$2,785,401	78.1	24.1
Number of persons employed	1,269	1,166	918	38.2	8.8
Salaries and wages.	$1,269,608	$ 999,864	$ 775,045	63.8	27.0
Total hp.	140,009	131,734	82,427	69.9	6.3
Steam engines:					
Number	105	91	141	—25.5	15.4
hp.	65,467	56,499	56,547	15.8	15.9
Internal-combustion engines:					
Number	11	1	4	175.0	1,000.0
Hp.	527	80	300	75.7	558.8
Water wheels:					
Number	58	64	47	23.4	—9.4
Hp.	74,015	75,155	25,580	189.3	—1.5
Kilowatt capacity of dynamos	94,791	71,668	53,130	78.4	32.3
Output of stations, kw.-h.	274,223,978	165,196,068	123,275,212	122.4	66.0
Stationary motors served:					
Number	8,843	4,780	3,232	173.6	85.0
Hp.	132,013	60,451	41,161	220.7	118.4
Number of street lamps:					
Arc	3,175	3,859	[2].....	.....	—17.7
Incandescent, etc.	10,238	7,872	[2].....	.....	30.1

[1]A minus sign (—) denotes decrease. [2]Not available.

CENTRAL-STATION STATISTICS FOR VIRGINIA.

	1917.	1912.	1907.	Per cent of increase.[1] 1907 to 1917.	1912 to 1917.
Number of establishments	94	67	51	84.3	40.3
Commercial	70	53	37	89.2	32.1
Municipal	24	14	14	71.4	71.4
Income[2]	$2,417,086	$ 805,022	$ 390,628	518.8	200.2
Electric service...	$2,372,099	$ 794,858	$ 380,779	523.0	198.4
All other	$ 44,987	$ 10,164	$ 9,849	356.8	342.6
Total expenses, including salaries and wages	$2,084,916	$ 567,459	$ 261,795	696.4	267.4
Number of persons employed	561	341	178	215.2	64.5
Salaries and wages.	$ 453,322	$ 170,884	$ 99,060	357.6	165.3
Total hp.	90,930	59,585	14,619	522.0	52.6
Steam engines:					
Number	86	66	40	115.0	30.3
Hp.	40,235	15,120	5,008	703.4	166.1
Internal-combustion engines:					
Number	24	3	1	2,300.0	700.0
Hp.	921	185	60	1,435.0	397.8
Water wheels:					
Number	70	63	44	59.1	11.1
Hp.	49,874	44,280	9,551	422.2	12.6
Kilowatt capacity of dynamos	65,913	40,512	9,195	616.8	62.7
Output of stations, kw.-h.	107,580,758	28,724,684	10,208,360	953.8	274.5
Stationary motors served:					
Number	2,243	753	268	736.9	197.9
Hp.	27,763	8,570	3,690	652.4	224.0
Number of street lamps:					
Arc	813	2,513	[3].....	.....	—67.6
Incandescent, etc..	12,813	4,369	[3].....	.....	193.3

[1]A minus sign (—) denotes decrease. [2]Exclusive of $3,325,008 in 1917, $2,007,620 in 1912, and $1,437,087 in 1907, reported by street and electric railway companies as income from sale of electric current for light or power. [3]Not available.

CENTRAL-STATION STATISTICS FOR NEW HAMPSHIRE.

	1917.	1912.	1907.	Per cent of increase.[1] 1907 to 1917.	1912 to 1917.
Number of establishments	59	59	56	5.4	....
Commercial	55	56	52	5.8	—1.8
Municipal	4	3	4	.....	33.3
Income[2]	$3,269,929	$2,328,263	$1,422,345	129.9	40.4
Electric service...	$3,093,910	$2,200,733	$1,321,296	134.2	40.6
All other	$ 176,018	$ 127,530	$ 101,049	74.2	38.0
Total expenses, including salaries and wages	$2,471,441	$1,596,152	$ 912,214	170.9	54.8
Number of persons employed	732	578	422	73.5	26.6
Salaries and wages.	$ 603,027	$ 434,617	$ 286,749	110.3	38.7
Total hp.	93,331	84,228	46,784	99.5	10.8
Steam engines:					
Number	46	56	57	—19.3	—17.9
Hp.	34,794	25,386	20,265	71.7	37.1
Internal-combustion engines:					
Number	11	11	8	37.5	....
Hp.	1,228	1,905	1,115	10.1	—35.5
Water wheels:					
Number	105	115	101	4.0	—8.7
Hp.	57,309	56,937	25,404	125.6	0.7
Kilowatt capacity of dynamos	65,560	57,768	31,917	105.4	13.5
Output of stations, kw.-h.	160,456,223	126,593,970	55,258,921	190.4	26.7
Stationary motors served:					
Number	3,743	1,958	1,061	252.8	91.2
Hp.	41,020	18,488	10,231	300.9	121.9
Number of street lamps:					
Arc	67	1,482	[3].....	.....	—95.5
Incandescent, etc.	14,768	9,100	[3].....	.....	62.3

[1]A minus sign (—) denotes decrease. [2]Exclusive of $21,293 in 1907 reported by street and electric railway companies as income from the sale of electric current. [3]Not available.

CENTRAL-STATION STATISTICS FOR DELAWARE, DISTRICT OF COLUMBIA AND MARYLAND.

	1917.	1912.	1907.	Per cent of increase.[1] 1907 to 1917.	1912 to 1917.
Number of establishments	63	56	50	26.0	12.5
Commercial	47	43	36	30.6	9.3
Municipal	16	13	14	14.3	23.1
Income[2]	$9,192,308	$5,388,403	$3,347,728	174.6	70.6
Electric service ..	$9,008,297	$5,304,333	$3,298,747	173.1	69.8
All other	$ 184,011	$ 84,070	$ 48,981	275.7	118.9
Total expenses, including salaries and wages	$7,454,423	$4,213,854	$3,819,147	95.2	76.9
Number of persons employed	1,399	1,249	1,024	36.6	12.0
Salaries and wages.	$1,270,721	$ 936,895	$ 759,508	67.3	35.6
Total hp.	204,131	116,744	85,346	139.2	74.8
Steam engines:					
Number	74	112	148	—50.0	—33.9
Hp.	199,914	111,622	83,584	139.2	79.1
Internal-combustion engines:					
Number	16	11	5	220.0	45.4
Hp.	1,187	1,073	130	813.1	10.6
Water wheels:					
Number	24	33	18	33.3	—27.3
Hp.	3,030	4,049	1,632	85.7	—25.2
Kilowatt capacity of dynamos	131,288	89,887	62,956	108.5	46.0
Output of stations, kw.-h.	326,439,753	118,034,857	78,412,197	316.3	176.6
Hp. of stationary motors served	188,192	76,527	32,856	472.8	145.9
Number of street lamps:					
Arc	5,928	5,404	[3].....	.....	9.7
Incandescent, etc.	22,483	16,409	[3].....	.....	37.0

[1]A minus sign (—) denotes decrease. [2]Exclusive of $1,139,531 in 1917, $622,393 in 1912, and $214,123 in 1907, reported by street and electric railway companies as income from sale of electric current for light and power. [3]Not available.

THE AMERICAN BEET SUGAR INDUSTRY.

At a joint meeting of the American Institute of Electrical Engineers, American Society of Mechanical Engineers and Western Society of Engineers in Chicago, Jan. 27, M. J. Kermer read an interesting paper entitled, "The American Beet Sugar Industry" that covered the process of making sugar from beetroots.

The process involved, from the time the beets were delivered at the plant to the finished product packed in cartons was described in detail. The large amount of heat required for diffusion, carbonization and evaporation results in the sugar beet factory usually operating its own power plant, from which electrical power for the conveyors, centrifugals, etc., is obtained. For power purposes, electric drive is almost exclusively adopted.

Commercial

War Activities of Brooklyn Utility—Successful Use of Electric Quilts in Hospitals—All-night Street Lighting

BROOKLYN EDISON COMPANY'S WAR ACTIVITIES REVIEWED.

T. I. Jones Tells of Part Played by Utility in Address Before Company Employes.

A notable meeting took place last night at the Central Y. M. C. A. Hall, Hanson Place, under the auspices of the Brooklyn Edison Section, National Electric Light Association. The hall was crowded to the doors with an enthusiastic and interested audience.

The feature of the evening was an address by T. I. Jones, general sales agent of the Brooklyn Edison Co., on "Brooklyn and the Brooklyn Edison Co in the War." The address was illustrated by nearly 100 lantern slide pictures, and upon the stage was an exhibition of many samples of Brooklyn's war product including a 17-ft. torpedo weighing 2000 lb., manufactured by the E. W. Bliss Co., uniforms of all kinds, foreign and domestic, an aviator's suit electrically heated, gas masks, shells of all sizes, Sperry gyroscope, and other apparatus, all "Made in Brooklyn."

In describing Brooklyn's war activities, Mr. Jones began his story with the detail of Brooklyn's contribution to the Army and Navy. One hundred and five

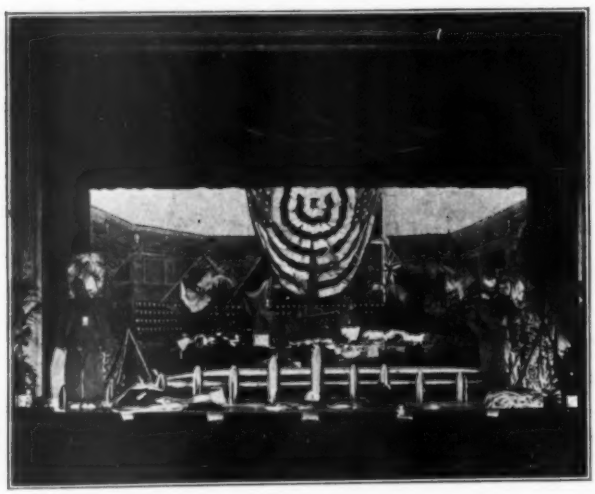


Exhibit of Brooklyn Made War Products.

thousand Brooklyn boys were in service, of whom 75,000 were sent abroad. Brooklyn's casualties, Mr. Jones said, numbered 2000 dead and 6500 wounded.

The results of the Liberty Loan campaigns in Brooklyn were given in detail by the speaker, the total of Brooklyn's subscriptions being $227,669,000.

Brooklyn's contribution to the Red Cross, Knights of Columbus, Y. M. C. A., Jewish War Relief, United War Fund and other organizations of this type were announced as having totalled $8,651,730. Astounding figures were given as to the results in the war work of Brooklyn's school children.

The effective part played by the Brooklyn Edison Co. in all these activities was emphasized.

Mr. Jones then gave some exceedingly interesting facts and figures concerning Brooklyn's industrial contribution to the war. Pictures were shown of Brooklyn's dry docks and ship-building establishments, and detailed descriptions as to their tremendous achievements.

The part played in the war by the Sperry Gyroscope Co., Eiseman Magneto Co., Wm. H. Jackson Co. and other manufacturers of special apparatus was shown.

An exceedingly interesting section of the talk dealt with the achievements of Brooklyn garment manufacturers, giving special facts and figures, showing pictures of the output of Brooklyn's many manufacturers of uniforms, caps, shirts, rubber coats, overcoats, etc. The figures given ran into the millions.

Pictures were thrown on the screen showing the new Brooklyn industrial buildings erected since America entered the war, including the United States Army Base and the United States Navy Base on the South Brooklyn water front. The Army base, it was pointed out, consisted of two principal buildings, the two largest concrete structures in the world. If the wooden piles required for the foundation of these buildings were stretched end to end they would reach 307 miles; a train of 32 miles of cars would be required to carry the 2,084,000 bags of cement used; 2273 miles of board lumber was used, also 1,267,200 ft. (240 miles) of piping and conduit. These buildings have 5,085,000 sq. ft. of floor space. On the 96 electric elevators in the buildings there are 107,000 ft. (20 miles) of elevator rope. Seven thousand men were employed in the construction of this base. Similar figures were given concerning the Naval base.

Mr. Jones then set forth the achievements of Brooklyn in the manufacture of metal products of all kinds, showing that Brooklyn furnished a notable portion of the metalware and machinery used in every branch of the service.

Another interesting set of facts and figures referred to the munitions production of Brooklyn, showing the number of torpedoes, shells, grenades, gas masks, and quantities of high explosives, etc., manufactured by such concerns as E. W. Bliss Co., Doehler Die Casting Co. and Bartlett-Haywood Co. The enormous production of rope for varied Government purposes by the American Manufacturing Co. and other Brooklyn concerns, and of tobacco in the Brooklyn factory of the American Tobacco Co., were also set forth in Mr .Jones' talk.

A slide was thrown on the screen giving the names of some of Brooklyn's varied war products as follows: Anvils used in the Navy Yards for foundries and shoeing horses, aviators' boots, flying suits, helmets, suits (heated electrically), uniforms, barges and lighters, bed socks, Browning machine gun parts; cargo slings, carts for ammunition, chemicals, cigar-

ettes, clocks used for Army and Navy; clothing of every description for Army and Navy, cocoa compound, coffee urns, cot bottoms; crank shafts for Liberty motors; dials for air speed of airplanes, altitude of airplanes, bomb sights in aero bomb throwers, submarine compasses; equipment for washing and drying coffee drums on ships, explosive oils, fencing plastron, field desks, field kitchens; gas masks, gasoline measures, gauges for measuring shells, guns and rifles, gears for Army trucks, airplane and hydroplane motors, gun sights, submarine chasers, etc.; gun carriages, gyro compasses; hammocks, haversacks, heat treating appliances, ledgers and journals used by Army and Navy, life saving garments; machinery and tools for making airplane parts, airplane bombs, airplane radiator tube making machinery, brass cartridge cases for shrapnel, artillery and Navy shells, Browning gun parts, canteens; copper bands for high explosives and other types of shells, cartridge clips, drop forging machinery for ship parts and various articles of marine hardware, depth bombs, electrical apparatus, field surgical and optical instruments, field kitchens, fuse and detonator parts, gas masks, hard bread cans, horse and mule shoe machinery; Lewis gun machines, machine gun carriages and parts, motor truck parts, mess tins, metal containers for all kinds of food products, powder cans, rifle and pistol cartridges and bullets, rifle parts and straps, steel shrapnel cases, steel helmets, shrapnel bullets, submarine mine cases, scabbards and bayonets, spark plugs, shell cases, sheet steel parts for field guns, tracer bullets, trench knives, oil and water tanks, oxygen paravenes, powder bags, rope used by Army and Navy ¾ in. to 16 in.; rotary scrapers for gun, ship hulls, etc.; stanchions for ships, signals, nails, stabilizers for ships, stabilizers for airplanes, searchlights (high intensity), submarine chasers, shells 3 in. to 9.2 in., searchlight carriers, superdreadnaughts, sailor caps, spiral puttees, sweaters, steel masts for ships, submarine net buoys, stearing engines, saddle bags, steel tool for high speed machines, surgical instruments for Army and Navy, trench mortar, trench buckets, time fuses, trench mirrors, torpedoes, thermometers, tarpaulins, water coolers, winches for captive balloons, winches on ships.

W. W. Freeman former vice-president and general manager of the Brooklyn Edison Co. and now president of the Union Gas & Electric Co. of Cincinnati, was present and addressed the meeting on "Public Ownership of Utilities." Short addresses were also made by Capt. Alfred Brooks Fry, U. S. N.; E. D. Kilburn, district manager, Westinghouse Electric & Manufacturing Co., New York; H. M. Edwards, auditor, New York Edison Co., and F. W. Smith, vice-president United Electric Light & Power Co., New York.

SUCCESSFUL USE OF ELECTRIC QUILTS.

The successful use of electrically heated quilts in hospitals is reported by Dr. Fred E. Wynne, Medical Officer of Health for Wigan, England. He states that the quilt he has adopted consists of an extremely flexible insulated resistance wire introduced between two layers of fabric so as to form a light and comfortable bed covering which is speedily warmed to the required temperature at a low consumption of electricity. Of the two layers of fabric the inner is made of a heat-conducting substance, so that the heat is readily transmitted to the patient, while the outer layer is non-conducting, so as to conserve the maximum of heat. With a supply at 115 volts or less the quilt can be connected directly to a plug or lampholder, but with higher pressure a small transformer or resistance is necessary.

These quilts at first were used by Dr. Wynne simply as a means of supplying warmth to consumptive cases sleeping out of doors or in shelters. The constant and evenly distributed temperature was a great boon and promoted sleep, while the saving of labor and fuel by the elimination of the old hot-water bottle was a tremendous advantage from the administrative point of view. Since then the quilts have been used in the fever wards, and it is found that by the superposition of one or more blankets, according to the room temperature, a bed temperature of 90° can be attained in less than half an hour and maintained without appreciable fluctuation for an indefinite period. This temperature is sufficient to produce and to maintain sweating as long as desired, and the system has proved most valuable in the treatment of hyperpyrexia, post-scarlatina, nephritis, etc. Dr. Wynne has no doubt that it would be found equally valuable in cases of post-operative shock, severe hemorrhage, and all conditions in which the provision of external heat without disturbance of the patient is indicated. The price of these quilts is moderate and the amount of current used is very small.

CLINTON, IOWA, TO HAVE ALL-NIGHT STREET LIGHTING.

New Contract Also Calls for Replacing of Present Arc Lamps and Additional Units.

The Clinton (Iowa) Gas & Electric Co. recently entered into a new contract with the council of that place which provides for additional street-lighting units and an all-night schedule, instead of the present moonlight lighting, and at the same time reduces the unit rental from $60 to $55 per year. This reduction will be made possible by replacing the present arc lamps, of which there are 211 now in service, with modern tungsten units. In addition, the company will install 20 new units at places to be designated by the council.

The new contract was entered into at the request of the company which desired to improve the lighting conditions of Clinton and modernize its equipment. In commenting on the matter, Thomas Crawford, manager of the company, explained that the higher efficiency of the new units presented considerable savings which the company was willing to give the city the benefit of.

DUQUESNE LIGHT TO CONDUCT HOUSE WIRING CAMPAIGN.

The Duquesne Light Co., Pittsburgh, Pa., is following out its custom adopted a few years ago to conduct a special campaign in the wiring of old houses. Up to the present time the company has installed equipment for electric service in about 15,000 houses in Pittsburgh and vicinity. A special house-wiring offer is now being made covering the installation of circuits, fixtures, etc., in houses of six or more rooms. Taking this number of rooms as a basis, the company has adopted a plan to wire and install fixtures for a cost of $79.75 on the easy-payment plan, an amount of $8.25 being due on the completion of the work and $6.50 per month for eleven months. The plan is limited to prospective consumers on the company's lines.

Operating

Practical Meter Box—Repairing Steel Stack with Cement —Surface Radiation—Insulator Test—Commutator Wear

A STANDARDIZED METER BOX.

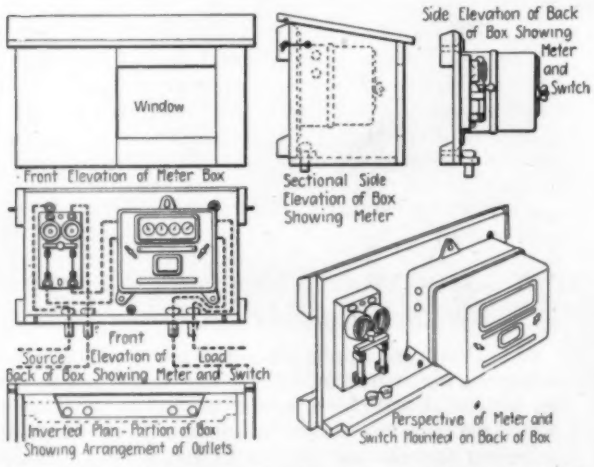
Policy of Southern California Edison Company Is Found Advantageous.

By W. R. FRAMPTON,
Southern California Edison Co.

The Southern California Edison Co. has had considerable difficulty in the past in protecting meters from the weather and fog, a large part of its territory being in seacoast cities and towns. Meters would be set in places where they would be unprotected from the weather and the cases would corrode and in a short time be of no value as the cover for the meter would be eaten through with salts, etc.

Several boxes were designed, but it was important that some standard be adopted. Meters would be set in places where there was not enough excess room to allow boxes with swinging doors, also in places where it would not be practicable to set a meter in a self-contained box in one piece. Therefore, a box was designed to take care of all single-phase induction meters, the design of the box allowing for the largest dimension of the meter and main control entrance switch.

Looking over the accompanying diagrams it will be seen the back of the box is separate from the rest and can be installed on any wall with a meter, switch and wiring, after which installation the cover is slipped on in a horizontal position and the eye hooks on either side fastened. The box is made waterproof and there is no danger of weather affecting the meter. After the box is made, the whole unit is dipped in paint or creosote and allowed to stand long enough to impregnate the wood, with which process it will withstand the weather for a considerable period of time. Bushings are used for entrance at the bottom of the back. Sometimes these are substituted with circular loom, if city ordinance will permit.


Window
Front Elevation of Meter Box
Sectional Side Elevation of Box Showing Meter
Side Elevation of Back of Box Showing Meter and Switch
Front Elevation of Back of Box Showing Meter and Switch
Source
Load
Inverted Plan - Portion of Box Showing Arrangement of Outlets
Perspective of Meter and Switch Mounted on Back of Box

Standardized Meter Box Employed by Southern California Edison Co.

The company finds by supplying these boxes free to the consumers they are money in pocket. Also, the meter is kept clean and new, the cost of the box being approximately $1, while the cost of replacing the meter cover and back averages about $2.50. In some cases they have to be replaced yearly where exposed to extremely bad climate. Further, with this type of box the meter is easily read by the meter reader through the window. If for any reason, whatsoever, an inspection has to be made, it requires but a few seconds to take the cover off and everything is handy to work upon the meter. In other words, you do not have to work inside of the box when working on the meter.

The Southern California Edison Co. requires these meter boxes to be set on all outside walls, except under low and wide eaves and inland towns. Meters installed in factories, work-shops and foundries must be protected from steam, excessive moisture, mechanical fumes, sawdust, coal or ashes, etc., by being enclosed in this approved and moisture-proof meter box.

The meter box is built so that the back may be used as a standard meter board, on inside jobs that do not require a cover. It thus serves a double purpose. The box now has been in use in the neighborhood of four or five years and has appreciably cut down the maintenance on meter repairs.

In different districts the wiremen who wire a house are furnished the back of the box which is installed by them and all that is necessary for the meterman to do when setting the meter is to cut the meter loop, hang the meter and put the cover on, which can be done in a very short space of time. Otherwise, he may have to change the whole wiring scheme of the wiremen in order to fit the conditions.

CEMENT GUN FOR REPAIRING STACKS.

Interesting Method of Repairing Corroded Steel.

At the plant of the Pittsburgh Crucible Steel Co., of Midland, five self-supporting stacks, 125 ft. high and about 6 ft. in diameter at the top, were badly corroded by the gas from the furnaces finding its way through the brick lining of the stacks and eating out the steel plate. The corrosion became very general; so much so that in places a man could put his hand through the plate and it became absolutely necessary to rebuild or repair the stacks. It was decided to build reinforced, self-supporting shells around these stacks by employing the cement gun. The stacks are now completed and the construction work proven entirely satisfactory.

At each ring hook bolts were tapped into the stack, carrying steel bands properly spaced from the stack, the bands in turn carrying vertical reinforcing rods of square twisted steel, around which was wrapped wire mesh. A shell of gunite, cement grout or liquid con-

crete squirted through a hose under high air-pressure from a "cement gun" of special construction, has been applied against this reinforcement. The great advantage in this method of reconstruction lies in the fact that the stacks were enabled to be kept in constant operation during the progress of the work, except for a few days on each stack while the gunite was being applied to the upper portions of the stack, During these few days each stack was cut out of service so that the material would not dry out too quickly, the upper portions of the stack being less protected from the heat of the gases than the lower portions. The method of construction employed also resulted in less expense than the building of forms around the present steel stacks and the use of ordinary concrete. The speed of the work also was much superior, inasmuch as the operating crew was able to apply 20 to 25 ft. of gunite in a day, instead of the ordinary 5 or 10 ft. possible with the use of forms and ordinary concrete. Each stack required 1100 cu. ft. of finished gunite, which is reinforced with about 1½% of steel. After the completion of the second stack, swinging scaffolds of special design were used instead of continuous timber scaffolds, with improved success.

HEAT RADIATION FROM COLORED SURFACES.

Some recent experiments made at the National Physical Laboratory, London, by Dr. J. A. Harker on the radiation from surfaces show that the color of a hot surface at relatively low temperature has very little influence upon the amount of radiation leaving it.

In a series of experiments the sides of a thin cubical metal canister were painted in panels of varying color, the interior of the cube being filled with rapidly stirred oil electrically heated. The amount of pure radiation leaving each kind of surface at a series of steady temperatures up to about 200° C. was compared with that coming at the same temperature from a "black body" constituted by a re-entrant tube with appropriate diaphragms. The exterior of the tube was washed by the hot oil. For temperature differences in the region of 100° C. it was found that:

1. A bright surface of ordinary tin-plate only gave off an amount of radiation equal to 5 to 10% of that from a "black body." The quality of the optical perfection of the surface was of little importance so long as it was bright. A metal surface treated with galvanit of various kinds showed effects of the same order as tin-plate. Burnished copper well cleaned with metal polish gave a lower intrinsic radiation than tin.

2. A coat of almost any paint, regardless of color, brings the true radiation up to from 80 to 90% of that of a "black body," and a quite thin layer of paper varnish or of celluloid varnish, so thin and transparent as to be almost imperceptible to the eye, applied over the bright metal, has almost the same effect.

3. A layer of tissue-paper or wallpaper pasted over the bright surface, or a coating of whitening or limewash, shows the same kind of effect in restoring practically the full radiation so long as the coating is thin.

4. If the surface of the cube be metallized with aluminum paint, the pure radiation is reduced to from 45 to 55% of that of a "black body." Much depends, however, on the kind of vehicle used for the aluminum and different samples of aluminum paint, though giving results similar in appearance to the eye, differ considerably in the effects produced. Bronzing and such like processes produce intermediate effects.

In some later experiments a study was made of the total heat leaving surfaces, with a view of obtaining some data as to the relative effects of conduction, convection and radiation in ordinary still air. From these experiments it would appear that in the case of radiators in the region of 100° C., almost exactly half the heat leaving the vertical surfaces, if these are of an ordinary character or painted in the usual manner, consists of pure radiation, the remainder being the combined effect of conduction and convection. Therefore, if, as is a very common practice, the radiators be metallized by painting with aluminum paint, the amount of heat reaching the middle of a room warmed by such radiators will be lowered to half, or double the amount of heating surface will be required to produce the same radiation effect as if the surface were black or of bare metallic iron. This information may be usefully applied by operating engineers in choice of covering of machines, transformer cases, cooling tanks, etc.

INSULATOR TEST FOR CONTRACTION AND EXPANSION.

Contraction and expansion of porcelain and metal, each of which has a different coefficient from the other, has in the past been a prolific source of insulator failures. The fixing of metal pins by cementing them direct into the insulator makes a good job, provided the metal-work is correctly centralized and a sufficient cushion of cement separates porcelain from cement.

The following method of testing insulators to determine whether expansion and contraction may be expected to cause trouble in the way of cracks and unequal stresses is one used considerably in England. The insulator fitted with a thimble is immersed for five minutes in a freezing mixture at—7° C. The unit is then plunged into water at 85° C. for another five minutes. Repeating this procedure several times will show whether contraction and expansion cause trouble. On the other hand, the test does not damage the dielectric properties of the insulator, unless from expansion or contraction, which determination is the object of the test.

CARBON AND COMMUTATOR WEAR.

By R. E. Hellmund.

Carbon manufacturers, as well as manufacturers of dynamo-electric machinery, have made numerous tests to determine contact resistances, friction losses, etc., of various carbons for use as brushes. While such tests are of interest, they contribute very little towards the real practical need, namely, a carbon which can stand high current densities and high sparking voltages with small wear.

In order to develop such carbons, it would seem essential to first make tests determining how the carbon wear is affected by current density, sparking voltage and peripheral speed. Present indications are that with many commercial carbons very appreciable densities can be used if there is no sparking voltage, while sparking voltages up to 15 or even 20 volts across the brush cause very little wear at certain speeds, if the current density is low enough.

More data along this line should be of great advantage both to the carbon manufacturer and the electrical engineer interested in the design and operation of commutating machinery.

Contractor-Dealer

Method of Increasing Electric Fan Sales—Merchandising Policies Discussed at Massachusetts Contractors' Meeting

HOW DEALER CAN ADVOCATE MORE USE FOR FANS.

One Method of Increasing Fan Sales and Offering Real Service to Fan Purchasers.

The use of the electric fan has been considerably retarded because the majority of people still regard it only as a means of creating a cooling breeze during the summer. This has the effect not only of causing many possible purchasers to refrain from buying fans as being too expensive in proportion to the period of use but tends to make them a rather unstable article for the dealer to handle. Consequently the dealer is rather timid about stocking them, fearing that he will be left with a good share of his stock on hand should the summer prove unusually cool. On the contrary, if the season is especially long or hot the extreme demand soon exhausts his stock and many sales are lost as a result.

This condition has caused the manufacturers of fans lately to place more and more emphasis upon the other applications of the fan, especially those which require its use during the cooler seasons. Many of these uses when realized become more important than the original purpose. Probably the most prominent of these is the use of an electric fan as an aid in heating. That a material saving in fuel can be effected by using a fan to force a more rapid circulation of air has been demonstrated so often that it is no longer questioned. Its use for drying clothes is also quite generally accepted. The general public, however, has not been sufficiently acquainted with these other uses to fully appreciate them. What is needed therefore is a more general realization of these uses, rather than the introduction of additional uses, and this can be brought about much more directly and more satisfactorily by the dealer than by the manufacturer.

One method by which this can be accomplished and which should result in increased sales, not only of fans but other appliances as well, is to create a more general use of the fans already sold for these extra purposes. There is no doubt but that the owner of a fan can be induced to apply it to one of the later uses much more readily than its value for this purpose can be impressed upon a prospective purchaser. By doing so, however, this value will be more keenly appreciated by the latter. Furthermore, if the dealer has taken a little trouble to acquaint the owner with these uses, it will also serve to develop a higher opinion of the dealer's store.

Probably the easiest way of doing this is for the dealer to send out a letter to customers to whom fans were sold in previous years, stating some of the additional uses of the fan and suggesting that the fan which he has be put to one of these uses. Such a letter must, of course, be brief but state the advantages of the new application plainly. One method which has been used with considerable success by a dealer is reproduced herewith. The letter appears personal in order to attract the reader's attention and cause him to read it carefully. In addition it emphasizes the service which the firm offers to its customers and the letter itself is further proof of this.

Mr. John Smith.

Dear Sir: We wish to call your attention at this time to several extra uses to which the electric fan you purchased from us may be applied. As you remember, there was an extraordinary demand for these fans at the time you purchased yours and our salesmen were forced to depart from our regular rule, which requires that the fullest explanation accompany each sale. Feeling that our obligation to you is not fulfilled until you are fully acquainted with all these applications, we are taking this means of listing two other purposes for which it can be used.

1. Strange as it may seem, one of the most valuable uses of the electric fan is as an aid in heating. As you probably know, the time required to heat a room is very long and a considerable portion of your fuel is wasted either in bringing the rooms to the required temperature or in keeping them warm when they are not occupied. By directing the breeze of an electric fan upon the radiator or stove the air in an ordinary room may be raised to a suitable temperature in much shorter time than is usually required. Try it, and I'm sure you will effect a substantial saving in your coal bill.

2. There are also many methods of installing fans in the hot-air heating system which have been recommended by the Fuel Administration. If you are interested, call at our store and we will gladly explain them to you.

3. No doubt the members of your household have been inconvenienced on washdays by the difficulty of drying clothes in inclement weather. The electric fan placed in the drying-room will aid considerably in solving this problem.

These applications are typical of the many uses of electrical appliances which are not fully realized by purchasers and which will often change such appliances from a convenience to a necessity. Possibly there are other appliances in your home which are not used to their fullest extent or possibly there are other appliances which you feel you have only occasional use for but which if you but realized all their many applications, would find a ready place in your home.

In either case we are at your service.

The value of such a letter is evident. Primarily, it will mean that the so-called off-season use of fans will be greatly increased. This in turn will cause others who formerly regarded the electric fan as a luxury or who put off buying until the demand had exhausted the supply to appreciate these applications and purchase in plenty of time to utilize them. In addition the dealer will be looked upon not only as striving for business but as one who desires to give his customers the fullest possible return for their money.

There is one other feature which must not be overlooked. Dealers themselves should take advantage of the various applications they advocate for the appliances. Often we find a dealer who strenuously advertises the electric fan as an aid in heating and ventilating but who neglects to use the fans in his store for these same purposes and thus fails to readily demonstrate to purchasers how easily these other uses may be taken advantage of.

CO-OPERATIVE MERCHANDISING KEY-NOTE OF MASSACHUSETTS CONTRACTORS' MEETING.

View Point of Manufacturer, Jobber, Contractor and Central Station Expressed at Annual Meeting.

The annual meeting of the Massachusetts State Association of Electrical Contractors and Dealers held in Worcester, Jan. 9 was typical of the co-operative spirit which has been so strongly advocated among the various factors in the electrical field for some time. In addition to members of organization, representatives of central stations, jobbers, and manufacturing companies were present and took an active part in the proceedings. Alfred J. Hixon, of Boston, state chairman of the association, presided at the meeting.

Edward R. Davenport, sales manager of the Narragansett Electric Lighting Co., Providence, R. I., delivered a very interesting address on merchandising policies. Mr. Davenport criticised many of the policies now practiced by the different factors as being worn out and antiquated. The methods employed by many motor manufacturers in selling their apparatus are open to improvement. The practice of allowing a flat discount to customers having a certain connected load, for example, is based upon a load which was considered large some years ago but can not be considered as such now. The motor agency agreement and the engineering service often forced upon customers by manufacturers present other difficulties which should be remedied.

Referring to central-stations merchandising policies Mr. Davenport stated that the free renewal of lamps by these companies is on the decline and they are commencing to realize that such policies are a losing proposition. There is, however, no tendency among the central-station companies to restrict or abandon the sale of electrical appliances as it has been shown that such policies are justified.

J. M. Wakeman, general manager of the Society for Electrical Development explained the work done by this society in the securing of publicity and promoting sales campaigns and the new work which is being prepared for the future.

Samuel A. Chase of the Westinghouse Electric & Manufacturing Co. further advocated the correction of existing merchandising policies. He especially urged that central-station companies discontinue the practice of selling appliances at a price which did not give them a fair profit and advocated the installation of more electric service outlets in wiring installations.

W. L. Goodwin, author of the "Goodwin" plan explained very clearly the need for closer co-operation between the different organizations in the electrical field. He corroborated with Mr. Davenport in the need of more modern merchandising policies among the manufacturers and dealers and urged the further establishment of retail stores by contractors. The merchandising of established appliances by such stores, he pointed out, would stimulate the use of them to a considerable extent while the introduction of the newer appliances might well be undertaken by the central stations. However, clean, healthy competition between the central stations and dealers in this respect is much more desirable than competition with the drug, department and hardware stores. He particularly emphasized the need of further activity among the contractors in the wiring of existing buildings as the best method of increasing the use of electrical apparatus and appliances.

In commenting on the opposition to his plan which was brought out at the recent meeting of the Electrical Supply Jobbers' Association in Cleveland, Mr. Goodwin stated that his plan was not infallible and admitted that constructive criticism was surely acceptable. This plan, however, is the best one so far developed and until another and better one is originated deserves the support of the entire industry.

The following officers were elected: State Chairman, A. H. Grove of Norwood; secretary, J. E. Wilson, Boston; state committeeman, A. J. Hixon, Boston; executive committee, Wesley S. Snow, Brockton; H. W. Jones, Lenox, F. L. Ham, Worcester, A. O. Alexander, Lawrence, and G. B. Quimby of Boston.

USE OF FAN FOR HEATING ADVOCATED IN CHICAGO NEWSPAPER.

Dr. W. D. Evans of Chicago Tribune Boosts Use of the Electric Fan.

In a recent issue of *The Chicago Tribune*, in the section devoted to matters of health, Dr. W. A. Evans has some good words to say for the electric fan. Under the title of "Fan Heating" he discusses grates and fireplaces, the location of radiators and kindred subjects used for creating or utilizing heat. He then points out how these all have their limitations, causing excessive heat in one location and insufficient heat in another, drafts, etc., and why people move around to "keep warm."

Lack of circulation is the primary cause of all this, says Dr. Evans, and goes on to say, "Is the floor cold? Place the fan and tilt it so that warm air is driven to the floor zone. Is the rear of the room too cold? Place a fan near the ceiling and blow the hot air from that zone over towards the cold areas. Is the space around the radiators too hot? Place the fan so that the hot air is blown away from these and over to the cold parts of the room. Is cold air leaking in through the windward wall? Throw air against that wall with fans. Is window chill excessive? Throw hot air from the radiators against the cold windows with fans. Do you want to prevent window frosting? Use a fan to throw warm air against the window.

"Remember that most of our complaints of cold are not because we do not burn enough coal or do not keep the temperature high enough. They are because the heat is not distributed. If a man's head is in a stratum of air at 72 and his feet in one at 62 he feels cold. For such discomforts a fan is a satisfactory makeshift remedy."

DEFLECTOR FOR ELECTRIC FAN BREEZE.

Invention Aims to Eliminate Draft.

If an electric fan is placed too near to a person it is apt to produce too decided a chilling effect and prove uncomfortable. This is especially true of large fans or fans run at full speed. To overcome this difficulty there has been invented a special deflector for electric fans that can be either built into the fan guard or made separately and attached to the guard of any fan already in use. It is the invention of Richard C. White, of Jacksonville, Fla., and has been recently patented. Mr. White is making arrangements with some manufacturers to produce these deflectors, which have been declared to be very practical. They distribute the breeze over a wide zone and eliminate the intense draft.

New Appliances

Conservation and Other Tendencies in Fan Development—New Models and Construction Changes in Electric Fans

ELECTRIC FAN DEVELOPMENTS FOR 1919.

Summary of Principal Changes and New Types Made by Leading Manufacturers.

The exigencies of the war played havoc with all plans for development work on electric fans that was partly under way and contemplated for the season of 1919. The urgent need for conservation of raw materials as well as of labor and manufacturing equipment led to the restrictions of fan types and sizes by order of the Conservation Division of the War Industries Board. These restrictions have been withdrawn through the close of the war and through the disbanding of this board. However, it is possible that some of the conservation measures effected will become permanent. A number of manufacturers have listed fewer types and are ready to drop others as soon as present stocks are exhausted.

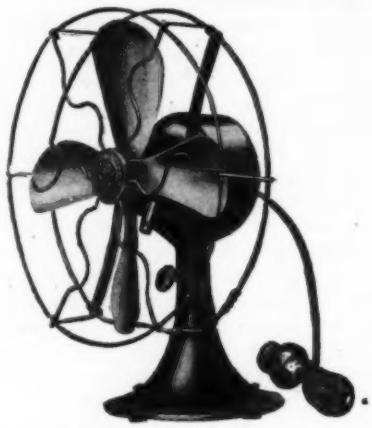
From the foregoing it is evident that no radically new types could be developed under such conditions. This does not mean that new types were not brought out, some of these having been practically completed before the War Industries Board held up its restraining hand. Considerable thought was given by most fan makers to methods for conserving material, especially copper, brass and steel. Brass fan blades and guards have been successfully replaced in many cases by pressed-steel blades and guards, these being thoroughly protected from corrosion. Other changes were introduced in the internal mechanism as well as in the base and frame, cast iron coming again into use in some cases.

Among the manufacturers who announce that no additions have been made in their models or changes in the construction thereof are the following: Century Electric Co., St. Louis, Mo.; Western Electric Co., New York; Hamilton-Beach Manufacturing Co., Racine, Wis.; Dayton Fan & Motor Co., Dayton, Ohio; Lindstrom-Smith Co., Chicago. A number of former makers of fans have dropped this line entirely, among these being the Crocker-Wheeler Co., Ampere, N. J.

In the following are given condensed summaries of changes made and new types brought out by prominent manufacturers. Due to the rush of work of some manufacturers, they were unable to supply us with this information in time for this issue and we expect to publish additional announcements in forthcoming weeks.

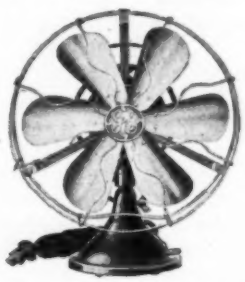
General Electric Co.

A new type, known as the G-E Whiz fan, is the latest addition to the line of fans made by the General Electric Co., Schenectady, N. Y. It is a 4-blade fan of 9-in. size and is especially developed to meet the demand for a small



G-E Whiz 9-in. A. C. Fan.

and efficient fan of low price for operating on standard 60-cycle alternating-current circuits. The total height of this fan is only 12 in. and it weighs only

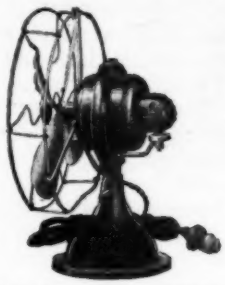


G-E 12-in. D. C. Oscillator.

7 lb. It can be used for either desk or bracket mounting, the adjustment requiring the single turning of a thumbscrew. Like other standard models of G-E fans, it has dark green finish throughout. The company has also

G-E 9-in. A. C. Desk and Bracket Fan.

listed a navy type fan, which is 12-in., made for both 80 and 123-volt circuits. It is a 6-blade fan with specially enclosed motor meeting the requirements of the Navy Department specifications,



G-E 9-in. A. C. Oscillator.

thus being especially suitable for exacting marine service. A somewhat similar type has been especially designed for the Emergency Fleet Corporation. This also is a 12-in., 6-blade fan, but made

G-E 56-in. D. C. Ceiling Fan.

only for 115 volts. Each of these fans is of non-oscillating and provided with totally enclosed motor, especially suitable for shipboard use.

Emerson Electric Manufacturing Co.

Six new or changed models have been introduced by the Emerson Electric Manufacturing Co., St. Louis, Mo. The chief change in style has been made in the 12 and 16-in. non-oscillating alter-

New Emerson 56-in. Ceiling Fan.

nating-current fans. Trunnions have been eliminated on these styles and new models are equipped with swivel-hinge base of a conical design similar to that employed for several seasons on Emerson oscillators. These fans may be

Emerson 16-in. A. C. Oscillator.

turned laterally on the swivel or may be tilted or deflected as formerly. Pressed-steel bottom plates with special felt covering that is secured by an ex-

Emerson 16-in A. C. Oscillating Fan.

panding ring of steel inside the pressed-steel plate are used on these new models. New types of 4-blade, 12 and 16-in., and a new type of 12-in., 6-blade oscillator for alternating current are now listed. These resemble former models except that they have a slight difference in the base. Some of the direct-current types have been pro-

Emerson 12-in. A. C. Non-oscillating Fan.

vided with swivel-hinge bases like those described above. A new model ceiling fan of 56-in. sweep and with an induction motor has been introduced. This has a simple but attractive modern type of casing, richly finished in dark oxidized copper. The blades are provided with hand-rubbed mahogany finish.

Fidelity Electric Co.

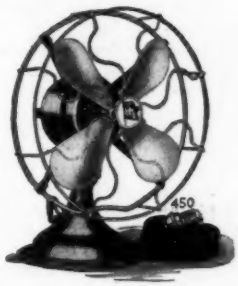
Although no serious changes have been made in the line of fans made by the Fidelity Electric Co., Lancaster, Pa., special attention has been given to further development in the universal 8 and 12-in. fans, which can be operated very successfully on direct or alternating-current circuits. The 8-in. fans have only one speed and the 12-in. three

Fidelity 12-in. Universal Fan.

speeds. Both types of fans are readily adjustable for bracket mounting or deflection to any desired angle.

The Robbins & Myers Co.

The 9-in. non-oscillating fan is a new model added to the line of the Robbins & Myers Co., Springfield, Ohio, to re-

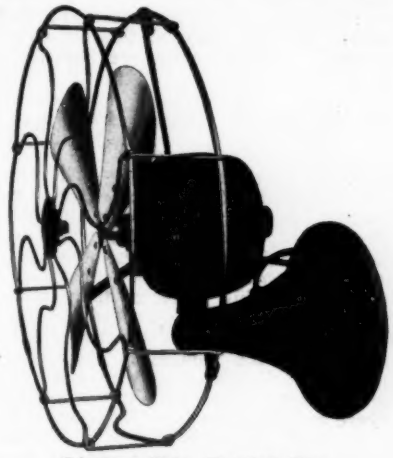


Robbins & Myers 9-in. Non-oscillating Fan.

place the 8-in. non-oscillating fan formerly supplied. This fan is illustrated herewith. It is furnished for direct current, 32 and 220 volts, and in the universal alternating-current-direct-current type for 100-120 volts. The fan has four blades and operates at three speeds. A hinge joint permits the fan to be operated in either the wall or desk position. It has drawn-steel frame and base and weighs about 8 lb. A feature of this fan is the very close speed regulation in the operation of the universal fan on alternating and direct current. All of the standard desk and bracket fans made by this company have drawn-steel frames. Each type has four blades, except the 9-in. oscillator, which has five blades.

Peerless Electric Co.

A number of important mechanical and electrical improvements have been made by the Peerless Electric Co., Warren, Ohio. Owing to the increasing demand for oscillating fans to be used in bracket positions and tilted forward some considerable degree, the gimball in the oscillators is equipped with two sets of ball bearings, thus eliminating all possible friction and making the fans serviceable in any position. The 9-in. diameter fans are made only in universal type. These are made now both in oscillating and non-oscillating models. All Peerless fans are equipped with



Peerless 12-in. Bracket Fan.

black enamel guards. Ceiling fans are made now only in the plain, three-speed type.

Eck Dynamo & Motor Co.

A new-style blade is being used by the Eck Dynamo & Motor Co., Belleville, N. J. This blade consists of the four fan leaves of the usual shape, but these are placed on a hub which separates the two pairs of leaves so that while revolving they travel through different planes. The effect of this is to very much reduce the humming noise, according to the statement of the manufacturer, that is noticed in the operation of motors of high speeds. This is accomplished without introducing other objectionable noises.

Bodine Electric Co.

A new 8-in. combination wall and desk fan has been placed on the market by the Bodine Electric Co., Chicago. This is a three-speed fan arranged for

Bodine 8-in. D. C. and A. C. Fan.

easy conversion from direct to alternating-current service. The change for this difference in supply requires simply changing one cord connection from one binding post to another in the base.

The connections and design of the motor are such that it operates very efficiently on either current. Three speeds are available, ranging from 1200 to 2200 r.p.m. The net weight of this fan is 7 lb. and it operates within the limits of 100 to 125 volts.

SPRAGUE ELECTRIC WORKS OF GENERAL ELECTRIC CO.

There are no radical changes in design in the 12 and 16-in. fans made by the Sprague Electric Works of General Electric Co., New York City, but by the use of main parts of both these sizes and an improved box and fan guard have more highly perfected these fans for this season. Motor bodies and bases are the same for the two sizes, as are also the windings. The fields have been slightly altered to suit the new form of swivel and oscillating link. There are two sizes of swivels, one for 12 and one for 16-in. fans. The new oscillating box is die-cast and its exterior is smooth and symmetrical, making an exceptionally good appearance. This box is oil-tight. The arrangement for engaging the oscillating mechanism is more simple, rugged, and effective. The worm on armature shaft has been altered to left-hand, so that the grease in the box will be worked away from the commutator. Motor body, base and guards are finished this year in green enamel, and the blades in bronze lacquer.

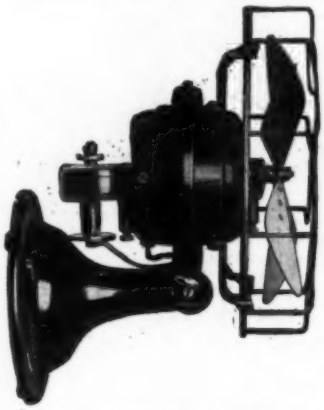
KNAPP ELECTRIC & NOVELTY CO.

An 8-in., low-voltage, direct-current fan has been introduced by the Knapp Electric & Novelty Co., 513 West 51st street, New York City. It is made in two voltages, either 32 volts for use in connection with farm lighting plants or 6 volts for operating on storage batteries such as automobile ignition and lighting sets. It is a light and well-made desk and bracket fan, adjustable to any angle. The company is also listing a new 110-volt, 8-in. fan of the universal type with four speeds for operating on either direct or alternating-current circuits. The two low-voltage fans are of the two-speed type.

Knapp 8-in. Low-Voltage D. C. Fan.

TIDEMAN ELECTRIC MANUFACTURING CO.

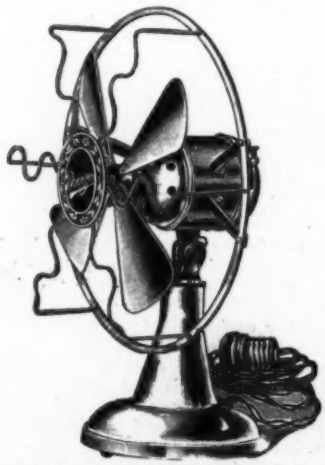
Although no new model has been introduced by the Tideman Electric Manufacturing Co., Menominee, Mich., a number of important changes have been made. One is that all the fan blades are dished or curved. The 8-in. fan now makes use of a cast-iron body and base. This is to give the fan weight and stop the vibration that small fans frequently manifest. This also prevents the fan from moving about on the desk or table top and reduction of the vibration reduces the humming sound. The curving of the blades further reduces the sound. The company has also made mechanical improvements in its oscillating mechanism, using gears that it is practically impossible to strip. The mechanism has been so arranged that it is impossible to stop the fan from oscillating by holding it by the hand and without hurting the gear in any way. After the body of the fan is released it again resumes oscillating as before. This is especially advantageous in that if anything interferes with the swinging of the oscillation no damage results. In the larger alternating-current fans which are of the induction type, the blade of the fan can be held still and the current turned on without doing any harm to the motor in contrast with most motors of this type, which would quickly burn out under this condition.



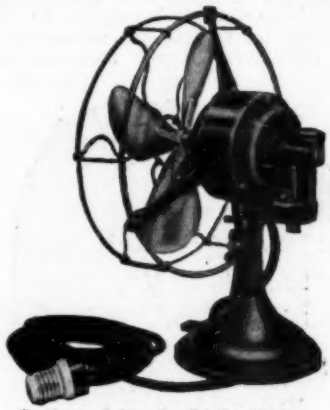
Tideman 16-in. D. C. Oscillator.

Models of Fans But Slightly Changed.

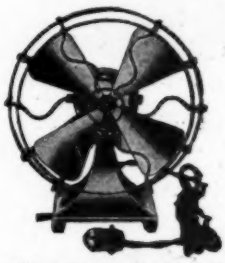
A number of fan manufacturers have supplied us with cuts of their fans which have been changed in little details or which are practically the same as have proved very satisfactory in recent years. Illustrations of these are shown herewith.



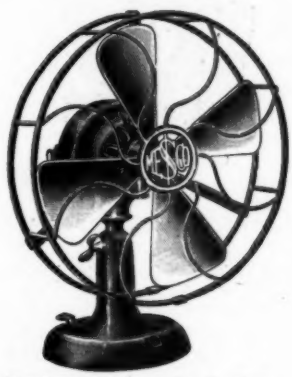
Lindstrom-Smith Breezer Fan.



Century 9-in. A. C. Oscillator.



Hamilton-Beach Cyclone Fan.



Manhattan 12-in. D. C. Fan.

Quick-Make Starting Switch.

One of the new equipments brought out by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., is an interesting starting switch. The switch is designed for use where squirrel-cage motors are started with a full line voltage. The switch is known as the quick-make (and quick-break) starting switch (Type 816). Its ratings are 10 to 100 amperes, 25 hp. maximum, three-phase, 220, 440 and 550 volts.

This switch is extremely flexible in its applications; in addition to being a motor starting switch, it can also be used to control feeder circuits; it may be supplied in any of the following combinations, each having the quick-make and quick-break feature, for either hand or shipper-rod operation:

(a) Nonautomatic switch.

(b) Switch with low-voltage protection.

(c) Switch with inverse-time-element overload protection.

(d) Full automatic switch with low-voltage and inverse-time-element overload protection.

It is especially suitable for shipper-rod operation on account of the positive action of the contacts. It is impossible for the operator to retard the motion of the contacts after they have started to close and there can be no "teasing" of the contacts. Workmen who are accustomed to starting machines from line shafting by means of shifting belts have no confusing details to learn. They may start the motor-driven machine with the same starting motion they use in shifting belts.

Contacts are opened and closed in oil, thus effectually suppressing arcing. The contact is made or broken so quickly that the eye cannot follow the action. A rolling action confines the arc to the tips of the contacts and prevents pitting or roughening of the seating parts where final contact is made. A strong spring holds the contacts firmly in the closed position. These features result in greatly prolonged life for the contacts.

Drawn-steel construction is used, giving maximum strength with light weight, and assuring uniformity and interchangeability when new parts are needed

Westinghouse Quick-Make Starting Switch.

for replacement or repairs. The oil tank is supported by snap ring-latches. Removal of the tank clearly exposes the contacts and makes them easily accessible. When necessary to replace contacts each may be removed by taking out a single screw.

Contacts and contact supports are of the same construction used for Westinghouse Type A autostarters and magnetic contactors. This minimizes the number of spare parts that should be carried.

These starting switches are dustproof. Openings are provided for conduit wiring into the top of case; terminals for connecting motor and line wires are accessible when cover at top of starter is removed. Micarta insulation is used throughout.

Overload and low-voltage attachments may be added with no change in switch mechanism, as the toggle trip is common to all combinations of this switch.

Low-voltage protection not only opens the contacts on failure of power, but makes it impossible to close them again until return of voltage. Since the low-voltage coil is connected in the line circuit continuously, means have been provided to close the armature of the low-voltage circuit when the switch is in the "off" position, thereby giving protection to the coil and preventing burnouts. A safety stop may be provided by connecting one or more push buttons in series with the low-voltage coil.

The overload relay is the same as that used on type A autostarters. It has the inverse-time-element feature and is equipped with a regulating device, adjustment of which controls the degree and duration of the overload possible on a motor or feeder circuit. This adjustment can be made without opening the switch cover.

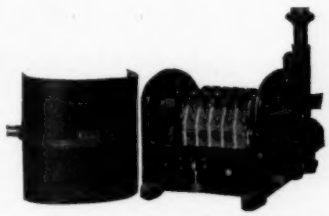
A hand reset is an additional safety feature which makes it necessary to set the mechanism before the switch contacts can be closed. Whether the contacts have been opened through the operation of the low-voltage coil, the overload relay, or by moving the switch handle to the "off" position, it is impossible

Westinghouse Quick-Make Starting Switch with Tank Lowered, Showing Accessibility of Contacts.

to close them again until the switch handle has been moved to the "reset" position. Thus protection is afforded workmen and valuable machinery which might be injured by accidental starting of the motor.

New Master Controller for Automatic Magnetic Controllers.

The accompanying illustration shows a new multi-speed full-reverse master controller for use with automatic magnetically operated controllers. This master is smaller than previous designs and is especially applicable in connection with steel mill and crane controllers where the operator's attention should not be diverted from the work or machine and where space is limited. An internal gear drive, which is entirely enclosed but which is readily accessible by the removal of four screws shown in the lower portion of the operating handle, eliminates the liability of accident to operators through the catching of fingers or clothing in the bevel gears usually employed in straight-line-drive controllers. This master may be mounted horizontally or vertically, the former permitting straight-line movement of the handle and the latter a radial movement. A centering latch operated by a button in the handle indicates to the touch the "off" position of the master, while a strong notching spring is used to indicate the five positions in either direction. A maximum of 12 fingers may be mounted on the finger board, using 6 in one direction of rotation and 6 in the other. The new controller, although very small and compact, is so designed that by the removal of two bolts the entire fingerboard may be taken from the frame, while the removal of three bolts allows the entire shaft and contact fingers to be withdrawn. Inspec-



New Compact Full-Reverse Multi-Speed Master Controller.

tion, renewals and repairs, are therefore easily effected. The construction of the finger board and drum follows the C-H standard, in that the fingers and segments are clamped to square insulated steel shafts, and adjacent contact points are separated from each other by arc barriers. This master controller is a new development of the Engineering Department of the Cutler-Hammer Manufacturing Co., Milwaukee, Wis.

New Thomas & Betts Conduit Specialties.

The Thomas & Betts Co., New York City, has recently placed on the market a number of interesting new specialties in the way of conduit fittings. One of these is an unusually well designed line of cutout boxes which are made up on high-power presses instead of on hand presses and consequently have sharply turned corners and symmetrical outlines instead of the sides sloping at various angles which is so common in the ordinary box of this kind.

Another new line consists of split elbows, couplings and tees, which devices enable the conduit circuit to be opened and inspected at any time it is desirable. They are also a desirable substitute for the bulky and unsightly pull box. These fittings are flanged in the bases, making them practically waterproof, and are furnished in a galvanized finish.

Still another line is the one-hole pipe straps which are made of extra heavy steel and are deeply grooved their full length, thus giving them great strength and rigidity, in marked contrast to the usual pipe strap of this type which frequently is of insufficient strength to carry the weight of the conduit.

The company also has placed on the market a very ingeniously constructed line of water-tight connectors which were used in great quantities by the United States Shipping Board to prevent moisture usually present on shipboard from following the electrical conductors into the outlet boxes and thus causing grounds, short-circuits, etc. These fittings are also suited for use in moist places in ordinary construction work.

Among other new devices is an offset fixture stud valuable in occasions where it is necessary for an outlet to be exactly centered in any space, and finally is the line of conduit enlargers and reducers which make it possible to secure almost any size of conduit into any size of threaded hole in pull or outlet boxes.

Trade Activities

Advance Electric Reorganized to Extend Activities—Potter-Lalley Electric Enters Merchandising Field—Catalogs

General Electric Co., through its Portland branch, has sold to the Cummings-Moberly Lumber Co., Tillamook, Ore., a 100-kw. turbogenerator for installation at the latter's new sawmill, where power will be produced for motor drive of all the mill machinery.

Davis Slate & Manufacturing Co., Chicago, Ill., has just completed arrangements for the equipment of a thoroughly modern slate factory at Toronto, Ont., Canada, which will enable the company to better serve its constantly increasing number of customers in the Dominion of Canada. A. H. Winter Joyner, of 100 Wellington street, Toronto, has been appointed Canadian sales manager, and William Wright, of Toronto, as superintendent of production.

Altorfer Brothers' Co., Peoria, Ill., is distributing a very attractive circular reproduced in three colors which deals with the A. B. C. "Super-Electric" washer, a machine that fills the every need of the American housewife for an efficient home laundry. The circular describes in detail the salient features of the machine and illustrates several types of this excellent labor-saving device. The A. B. C. washer has been endorsed by the Good Housekeeping Institute, and the great favor with which it has been met is further evidenced by extracts of letters from dealers of this product, which are reproduced in the circular.

Westinghouse Electric & Manufacturing Co. has just issued its circular 1591, subjected, "A Historical Review of Steam Progress." This publication was written by Francis Hodgkinson, whose commercial and engineering knowledge of the steam turbine is perhaps as broad as that of any man in America. The circular is a reprint of an article which appeared serially and is now gathered together in one publication with the intention of becoming a handbook on steam turbine progress. The early history of steam turbine engineering is gone into and the earlier machines installed in America are illustrated. From 1899 until 1917, each year's development is properly recorded as it occurred and the improvements noted. The booklet is profusely illustrated with views of all the different types of impulse and reaction turbines and the construction of blading, valve chamber, governor, throttle valve, coupling and oil cooler are shown in detail. This publication should be a valuable addition to designing and consulting engineers and is being used extensively in the Government training classes for junior engineers on steam engineering work.

Advance Electric Co., St. Louis, Mo., manufacturer of electric motors, generators and motor applications, is planning to increase its manufacturing facilities and to greatly broaden its business. Additional capital has been

Edward Bretch.

secured and the organization increased in order to broaden the activities of the company. The company was organized in 1904 by Edward Bretch, who has had a very interesting career. He was born in Indiana in 1874 and raised in Kansas, attending the University of Kansas, where his first knowledge of electricity was obtained. Coming to St. Louis in 1898 he became a designing engineer for the Wagner Electric Manufacturing Co. and for five years was engaged

F. V. Potts.

here in developing new types of electric motors. He joined the Century Electric Co. at its inception and remained with this organization for a year in the same kind of work. He then engaged in engineering work of his own and after two years of development the Advance motor was brought out and its construction was undertaken under the firm name of the Advance Electric Co., which has been in continuous operation until the present time under the supervision of Mr. Bretch. He has invented and patented some very essential devices in motor application, which are in general use by other manufacturers through royalty arrangements, and in addition has incorporated some distinctive features which are found in the Advance motors now being produced. In the reorganization of the company now being affected, Mr. Bretch has been made president and treasurer, and F. V. Potts, vice-president and secretary. The production department will be under the direct supervision of Mr. Bretch and Mr. Potts will have charge of the sales department, this being a line in which he has had much experience in previous years.

American Pipe Bending Machine Co., with offices at 39 Pearl street, Boston, Mass., is about to open up pipe-bending plants in all large cities throughout the country. The first plant is about ready for operation at Lowell, Mass. "Wonder" pipe benders, manufactured by this company, will be used at all plants. This company will make a specialty of furnishing bent pipe and make delivery of small orders at 48 hours' notice. Heretofore contractors and other users of bent pipe have had to wait from two weeks to three months to get deliveries. Each plant will have facilities for turning out from 1000 to 3000 bends per day, and will be in charge of an expert pipe bender. The present company was capitalized at $100,000; the old company is about to be reorganized with a capital of $1,000,000 to carry on this enlarged business.

Coppus Engineering & Equipment Co., Worcester, Mass., has issued a new catalog setting forth the principle and advantages of the Coppus turbo blower for undergrate draft and other industrial purposes, explaining in a very concise manner the theory of mechanical draft in connection with combustion. Various types of Coppus equipment are illustrated and described in detail.

Potter-Lalley Electric Co., a new corporation, has entered the merchandising field and will do a general electrical business in Des Moines, Iowa, leading in all kinds of electrical equipment, machinery and appliances. Ralph H. Potter is president and treasurer of the new enterprise, and E. P. Carney is vice-president and secretary. These two men and O. R. Potter constitute the board of directors.

Current News

Weekly Record of Construction Activities—Conventions

EASTERN STATES.

Portland, Me.—Fire recently destroyed the boiler plant and saw mill at the Russell Shipbuilding Co. plant at East Deering, near Portland.

Fitchburg, Mass.—Announcement has been made by the Fitchburg Gas & Electrical Co. that an increased schedule of rates will be placed into effect on Feb. 1.

Worcester, Mass. — Considerable new electrical equipment will be required in connection with the large theater building to be erected by Sylvester Z. Poli, at 595 Main street, Hartford, Conn., estimated to cost in excess of $250,000. Plans for the structure are now being prepared.

Phillipsdale, R. I.—American Electrical Works is planning for the construction of a pumping building at its plant at East Providence, about 20x20 ft. in size.

Warwick, R. I.—The town council has been petitioned for many additional street lights. A few new lights were installed, but the majority were referred to the superintendent of lights for investigation.

Ausable Forks, N. Y.—Ausable Forks Electric Co., Inc., has made application to the Public Service Commission for permission to construct an electric plant at Jay, Essex county, N. Y. The proposed plant is estimated to cost $25,000.

Brooklyn, N. Y.—The United States Government, Bureau of Yards and Docks, has awarded a contract to the Hamilton Electric Co., 357 Third street, for the installation of a new fire alarm signal system at the local Government site. The Department is also taking bids for the installation of new coal and ash handling equipment at the station, estimated to cost $80,000.

Hoffman Island, N. Y.—The Board of Health, Dr. L. E. Cofer, health officer, port of New York, has completed arrangements for alterations and improvements in the boiler equipment at the Quarantine Station.

Ithaca, N. Y.—Remington Salt Co., Cayuga Lake, is having plans prepared for the construction of a one-story boiler plant at its works, about 60x120 ft. in dimensions. The structure is estimated to cost $25,000.

Lyons, N. Y.—Niagara, Lockport & Ontario Power Co. is understood to be reducing its working force at its local plant, following the closing down of a number of manufacturing establishments in this vicinity engaged on war contracts, and to which the company furnished electric power for operation.

New York, N. Y.—Packard Lamp Division, 113 East 15th street, affiliated with the General Electric Co., has leased property at 10 East 18th street for increased operations.

New York, N. Y.—In connection with an application recently filed with the Public Service Commission by the Long Island Lighting Co., 50 Church street, for permission to increase its revenues, the company has decided to withdraw the request for a readiness to serve charge of 50c per month. It is understood that the company will change its application to a request for an increase in rate based upon the advanced cost of production.

New York, N. Y.—The Board of Managers of the Bronx Hospital, Inc., has recently filed plans for the erection of a one-story boiler plant at the institution, at Fulton avenue and 169th street. Including the construction of another building, the work is estimated to cost $30,000. Dr. Alexander Goldman is president.

Utica, N. Y.—The State Hospital Commission, Capitol, Albany, has completed arrangements for alterations and improvements in the heating plant and boiler equipment, etc., at the Utica State Hospital. E. S. Elwood is secretary of the commission.

Camden, N. J.—New York Shipbuilding Corporation has awarded a contract to the Fraser Brace Co., 1328 Broadway, New York, for the construction of a one-story substation, about 48x70 ft. in size, at its plant, to cost about $25,000.

Dover, N. J.—Wharton Steel Co. has inaugurated operations on a double shift at its Scrub Oak mines, to provide for increased capacity. It is understood that arrangements have been made with the New Jersey Power & Light Co. for furnishing the additional electric energy required.

Jersey City, N. J.—The Board of Freeholders has approved an appropriation of $226,500 in the annual budget for 1919, to provide for the operation and maintenance, etc., of the power plant.

Madison, N. J.—The Borough Council is arranging plans for the installation of new boiler equipment at the local fire headquarters.

Newark, N. J.—The Public Service Corporation has made application to the County Board of Taxation for a reduction on the 1918 tax assessments levied against the Public Service Electric Co., the Public Service Railway Co., and the Public Service Railroad Co. The aggregate assessment totals $8,744,275, and the corporation has requested a reduction of $3,605,545.63.

Newark, N. J.—The Board of Freeholders has approved an appropriation of $100,000 to provide for light, heat and power at the Overbrook Hospital for 1919.

Newton, N. J.—The Township Committee is considering plans to enlarge the electric plant at the local alms house, to provide for increased operations.

Pitman, N. J.—The Board of Public Utility Commissioners has denied the application of the Electric Co. of New Jersey and the Bridgeton Electric Co., Bridgeton, for permission to merge. It was proposed to issue stock of the consolidated company to holders of the stock of the merging companies, share for share, making the capital of the new organization equal to the combined stock of both companies, with 500 shares of preferred stock of the Bridgeton company issued at par to the American Railways Co. The Commission approved the issuance of preferred stock for $40,000 to the last mentioned concern, but declined to grant authority to issue stock for $50,000.

South Orange, N. J.—In its annual budget for 1919 the Township Committee has arranged an appropriation of $7900, to be used for street-lighting purposes during this period.

Trenton, N. J.—Hutchinson Storage Battery Co., 230 South Warren street, has had plans prepared for the construction of a one-story brick factory building.

Allentown, Pa.—Plans are being arranged by the Water Department for the erection of an electric-lighting plant to be used for municipal service at the local waterworks plant. Included in the plans is the installation of a steam-operated electric generating station, to be used to handle the excess boiler capacity at the pumping station for the lighting of streets, public buildings, etc.

Buttonwood, Pa.—Vulcan Iron Works, 730 South Main street, Wilkes-Barre, has had plans prepared for the construction of a one-story power plant at Buttonwood, near Wilkes-Barre. Westinghouse, Church, Kerr & Co., 37 Wall street, New York, are engineers for the company.

Harrisburg, Pa.—The contract has been let for five buildings for the Hamburg Sanatorium for Tuberculosis, amounting to $343,000. About $350,000 is still available for construction work at the various sanatoria in the state. The plans and specifications for the erection and installation of an electric light plant at Mont Alto Sanatorium and for an isolation hospital and garage at Cresson Sanatorium are about com-

plete and will be ready for advertising shortly after the new administration comes into power.

Mauch Chunk, Pa.—M. G. Prutzman, Court House, is having plans prepared for the installation of an electric plant.

Philadelphia, Pa.—Edgewater Dye Co., Frankford avenue and Nicetown Lane, has commenced work on the proposed alterations and improvements in the boiler plant at its works, estimated to cost $4300.

Philadelphia, Pa.—The city is considering plans for extensive improvements and extensions in the waterworks system.

Springdale, Pa.—Penn Power Co., Pittsburgh, will build a one-story steel, reinforced concrete and brick power plant, 200x900 ft. in size, at a cost of about $5,000,000. This work will be done by day labor.

Georgetown, D. C.—Fussell Young Ice Cream Co., 12th and V streets, Washington, D. C., has awarded a contract to Frank L. Wagner, 1413 P street N. W., Washington, D. C., for the construction of a two-story power plant, about 40x60 ft,. at Wisconsin and W streets, Georgetown, to cost about $25,000.

Washington, D. C.—The Ordnance Department is considering plans for the construction of an electrical shop at the local ordnance works.

Raleigh, N. C.—Palmetto Power & Light Co. has filed notice of an increase in its capitalization from $200,000 to $500,000, to provide for expansion.

Charleston, W. Va.—A number of important new bills have been introduced in the senate, among which is Senate Bill No. 98, introduced by Senator Coalter, providing for extensive hydroelectric development in West Virginia.

Wheeling, W. Va.—The city is making rapid progress in the installation of the new electric street-lighting system of the "white way" type, and it is expected that operations will be inaugurated at an early date.

Lowndesville, S. C.—Lowndesville Light & Power Co., recently incorporated, has arranged plans for the construction of a transmission system to be operated for local service.

Orangeburg, S. C.—The city has had plans prepared for the installation of a new generating unit at the municipal electric light plant.

Atlanta, Ga. — Establishment of electrical generating plant at municipal crematory is contemplated. Address superintendent of construction.

Augusta, Ga.—The city council appointed a committee to investigate advisability of establishing municipal lighting plant. Address William P. White, mayor.

Cordele, Ga.—The city is considering plans for the construction of an electric-lighting plant for municipal service.

NORTH CENTRAL STATES.

Oxford, Ohio.—The village council met to open bids for electric current. One bid was received from Robert S. Ashe of Richmond, Ind.

DATES AHEAD.

Oklahoma Utilities Association. Annual meeting, Oklahoma City, Okla., Feb. 6, 7 and 8. Secretary, H. A. Lane, Oklahoma City, Okla.

Illinois State Association of Electrical Contractors and Dealers. Annual convention, Chicago, Feb. 14 and 15. State secretary, G. A. Engelken, 55 West Harrison street, Chicago.

New Mexico Electrical Association. Annual meeting, Albuquerque, N. Mex., Feb. 17-19. Secretary-treasurer, Charles E. Twogood, Albuquerque, N. Mex.

American Institute of Electrical Engineers. Annual mid-winter convention, Engineering Societies building, New York City, Feb. 19-21. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

Wisconsin State Association of Electrical Contractors and Dealers. Annual convention, Hotel Pfister, Milwaukee, Wis., March 24-28. State secretary, John A. Piepkorn, 108 Sycamore street, Milwaukee, Wis.

Wisconsin Electrical Association. Annual meeting, Milwaukee, March 25-27. Secretary, J. P. Pullian, 1408 First National Bank building, Milwaukee.

Toledo, Ohio.—The issue of $3,200,000 in bonds was authorized at the annual meeting of the stockholders of the Toledo Railways & Light Co. for the acquisition, construction, extension and equipping of additional property, and for the making of betterments and extensions to the light and power property of the company. Address Henry L. Doherty, president of Cities Service Co., controlling company.

Crawfordsville, Ind.—Plans and specifications for the addition to the Crawfordsville Electric Light & Power Co. were adopted by the city council and bids for the equipment will be shortly advertised for. Address manager.

East Chicago, Ind.—An 8,000,000-gallon capacity water filtration plant at East Chicago has been announced by C. L. Kirk, vice-president and general manager of the Indianapolis Water Co. and vice-president of the East Chicago & Indiana Harbor Water Co. Bids have been asked for by the company. The estimated improvement will be $300,000. Bids will be opened Feb. 25. Work will be begun on the filtration plant 30 days after the contract is awarded and it will require a year and one-half to complete the contract. Special castings and fittings will be necessary. A bond issue will be floated to care for the financial part of the undertaking. The plant will be so constructed that it may be increased to 12,000,000 gallons capacity.

Evansville, Ind.—Indiana Public Service Commission has authorized Evansville Utilities Co. to create an issue of $15,000,000 first and refunding 10-year gold bonds and to issue $3,000,000 at 6% for not les sthan 90% of par. The company is reorganizing its finances. Henry W. Marshall is president.

Greensburg, Ind.—A company has been incorporated at Maxwell for the purpose of building transmission lines and purchasing power from the Greensburg municipal plant.

Indianapolis, Ind. — Indianapolis Forging Co. will erect a new building, 136x50 ft., reinforced concrete, to be used for office purposes. The company will also make some extensive improvements on its old buildings, the total cost of these improvements being $25,000.

Princeton, Ind.—Announcement has been made by the city council that the Princeton Light & Power Co. will at once begin the erection of a new system of street lighting, replacing all arc lamps with a system of large incandescents. The work was ordered more than two years ago, but was held in suspense by war conditions.

Rockport, Ind.—The county council of Spencer county has voted an appropriation of $175,000 for the erection of a new court-house at Rockport.

Terre Haute, Ind.—Terre Haute, Indianapolis & Eastern Traction Co. has filed a petition with the Illinois Public Utilities Commission for permission to increase passenger rates from 2½c to 2¾c. The company operates a traction line between Terre Haute, Ind., and Paris, Ill.

Aurora, Ill.—Western Gas & Electric Co. has filed a petition with the Illinois Public Utilities Commission asking permission to issue bonds in the amount of $155,000 and notes for $177,300.

Jacksonville, Ill.—The Park Board will complete lighting system in Central Park. Address secretary of the Park Board.

Springfield, Ill.—The City Council recently passed an ordinance authorizing Commissioner W. J. Spaulding to purchase from the Maloney Electric Co. of St. Louis two electric transformers for the city lighting plant, at a cost of $2,895.

Battle Creek, Mich.—Architect M. J. Nirehouse, 343 South Dearborn street, Chicago, Ill., has prepared plans for enlarging the power house at the plant of the Michigan Carton Co. Address W. J. Fell, manager, Battle Creek, Mich.

Howell, Mich.—At a recent municipal election it was decided to sell the municipal lighting plant to the Detroit Edison Co. for $50,000. The plant was built 16 years ago, and will be remodeled and considerably increased in capacity to care for several new industries.

Kinde, Mich.—$10,000 in electric light bonds are offered for sale Feb. 10. Address William Brinker, village clerk.

Chetek, Wis.—The council may purchase the electric plant owned by the Chetek Light & Power Co. Address J. W. Bell.

Rhinelander, Wis.—E. A. Forbes, president of the Rhinelander Lighting Co., has submitted a proposition to the people of Woodruff and Minocqua to construct a high tension power line from Rhinelander to those villages for electric lighting purposes. It is understood that the proposal is looked upon with favor by the residents of the two towns and in all probability the line will be built.

Aldrich, Minn.—The Little Falls Power Co., Little Falls, Minn., contemplates extending its transmission lines into Aldrich to supply the village with electricity.

Gary, Minn.—Gary Telephone Co. will build telephone line into Fleming in the spring and will improve line to Ada.

Hibbing, Minn.—The village plans to build an electric light and power plant to cost $50,000. Charles Foster is manager.

Ortonville, Minn.—The Tri-State Flood Central Association has been organized to eliminate the flood wash of the Red River Valley and for industrial developments and harnessing of flood water for power. Address A. B. Kaeches, of Ortonville.

Maquoketa, Iowa.—Iowa Electric Co. of Cedar Rapids, Iowa, will construct a high-tension line connecting hydroelectric plant at Anamosa with steam generating plant at Maquoketa. Address John A. Reid, general manager.

Kansas City, Mo.—Swift & Co. have awarded a contract for the construction of a three-story addition to local boiler plant, about 75x100 ft. in size.

Arlington, Neb.—The question of issuing $15,000 in bonds to construct a transmission line will be submitted to vote. Address city clerk.

Beatrice, Neb.—George Steinmeyer of this city will soon begin the construction of a hydroelectric plant in the Blue river near Barneston, 20 miles south of Beatrice, to double the amount of current used by Beatrice and to furnish electricity for Blue Springs, Wymore and other points. The proposed plant will cost about $125,000.

O'Neill, Neb.—At the annual meeting of the McGinnis Creamery Co. plans for the rebuilding of the creamery and lighting plant were discussed.

Wymore, Neb.—Franchise has been granted to the Nebraska Gas & Electric Co., Norfolk, for municipal electric system for five years.

Bismarck, N. Dak.—Plans under consideration by the Budget Board of State Administration for installing electric lighting plants in various state institutions.

Munich, N. Dak.—$3500 electric light bonds have been authorized. Address village clerk.

Columbia, S. Dak.—At a special election held recently a majority of the voters voted in favor of the issuance of bonds in the sum of $15,000 for the installation of a municipal electric light system. The system will be installed at the earliest possible date.

Watertown, S. Dak.—An election will be called to vote on the question of issuing $150,000 in bonds for a municipal light and water system. Address D. N. Hagan, chairman of the board.

SOUTH CENTRAL STATES.

Benton, Ark.—The city has completed negotiations for the leasing of the local electric plant, and it is understood that plans are under consideration for the purchase of the establishment for a consideration of $13,500. Upon completion of the transaction, new equipment to facilitate operations will be installed, including new generating unit, engines, etc.

Homer, La.—George Lewis is receiving bids for equipment for a cotton gin, corn-grinding plant and power plant.

Wilburton, Okla.—It is reported that the Sandstone Coal & Mining Co. is in the market for coal-mining, hoisting and power plant equipment. T. W. Choat is interested in the company.

Fort Worth, Tex.—Permission to lay wires underground on several streets was granted the Western Union Telegraph Co. by the City Commission.

San Antonio, Tex.—Fire recently visited the power plant of the San Antonio Public Service Co., causing a loss of about $25,000.

Highbank, Tex.—The electric light plant owned by the R. C. Peacock estate burned.

WESTERN STATES.

Cut Bank, Mont.—The question of whether Cut Bank shall have an electric light plant will be submitted to voters of the city. A 170-hp. power plant is proposed, with a two-unit hydroelectric and gas installation and a guaranteed daylight-to-daylight service. Meters will be installed and in all probability a 24-hour service will be maintained.

Mountain, N. Mex.—Franchise has been granted to Bob Adams to install a light and water system.

Boise, Ida.—Keystone Dredging Co. of San Francisco has purchased 800 acres of placer ground on Boise and Feather rivers, for which three high-capacity gold dredges are to be built. These will be electrically equipped. Capt. Rupert Winters, a well known dredge operator, is concerned in the organization.

Klamath Falls, Ore.—California-Oregon Power Co., of Medford, has planned the construction of a dam on Link river with the purpose of increasing power production.

Portland, Ore.—The Eagle Flour Mills, under construction, will require 600-kw. in motor power. This project is backed by W. R. Bagot & Co., Portland.

Seattle, Wash.—Rothert Process Steel Co., operating electric furnaces for making high carbon tool steel, is installing new equipment to increase its production to 10 to 15 tons per day. The equipment comprises smelting, reheating and annealing furnaces, steam hammer and three 175-kva. transformers.

Tacoma, Wash.—City Council has authorized the purchase of 8000 acres containing the Lake Cushman power site, paying $300,000 in 6% utility bonds. The cost of this proposed development is estimated at $5,000,000, and the power possibilities at 75,000 hp. The project involves a transmission line 40 miles long.

NEW PUBLICATIONS

Electrolysis and Its Mitigation.—The Bureau of Standards has issued the second edition of technologic paper No. 52, entitled "Electrolysis and Its Mitigation," by E. B. Rosa, chief physicist, and Burton McCollum, electrical engineer, of the Bureau of Standards. The book contains 137 pages and is profusely illustrated with halftones, line drawings and charts. This revised edition of the bulletin is a very complete discussion of the three-wire method of railway power distribution. The section on pipe drainage has been modified and a paragraph on automatic substations added. It is now ready for distribution and those interested may obtain a copy by addressing a request to the Bureau.

The Inflammability of Aluminum Dust.—The Department of Interior, Bureau of Mines, has issued Technical Paper 152 entitled, "A Study of the Inflammability of Aluminum Dust," by Alan Leighton. As several disastrous explosions of aluminum dust have happened in manufacturing establishments, the Bureau of Mines has thought it worth while to investigate the physical and chemical properties of the dust, with especial regard to inflammability and to the problem of extinguishing fires and of minimizing the force of explosions once started, and the results of the study made are incorporated in this very interesting bulletin. It reviews the available literature on the subject and discusses the preliminary experimental work, material used, properties affecting explosibility, etc. The method of procedure in making the explosibility tests and conclusions arrived at are dealt with at some length and summarizes the precautions to be observed. The price of this publication is 5 cents, and may be had by addressing a request to the Superintendent of Documents, Government Printing Office, Washington, D. C.

PROPOSALS

Boilers and Equipment.—Until March 4 the Board of Managers of Letchworth Village, Thiells, N. Y., will receive bids for the installation of a new central heating plant, to include three new boilers and equipment, underground connections, etc., the entire work being estimated to cost $300,000. Frank A. Vanderlip, 7 Wall street, New York, is president.

Boilers and Piping.—Bids will be received until Feb. 11 by the State Hospital Commission, Albany, N. Y., for installing boilers and piping in the power plant at the Utica State Hospital. Cost about $75,000.

Electric Elevator.—Bids will be received until Feb.. 12 by J. A. Wetmore, supervising architect, Treasury Department, Washington, D. C., for the installation of an electric passenger elevator in post office and court house at Ft. Worth, Tex.

Personal

A. W. Thompson Becomes President of Duquesne Light—J. H. Miller Joins Jewell Electrical Instrument—Changes

R. W. WUSTENFELD, formerly sales engineer for the Manhattan Electrical Supply Co., has become western manager of the electrical trades distribution of the White Sewing Machine Co., Cleveland, Ohio.

H. E. OSBORNE, JR., Los Angeles, Cal., has been appointed chief engineer of the Board of Public Utilities of Los Angeles, to succeed Franklin D. Howell, resigned. Mr. Osborne has been connected with the city engineering department for 22 years.

A. G. BERGSCHNEIDER, who has been superintendent of the Illinois Traction System in Decatur, Ill., for a number of years, has been appointed superintendent of transportation for the same company and will make his headquarters at Springfield, Ill. He succeeds E. E. Edmundson, who has resigned. Mr. Bergschneider is succeeded at Decatur by Alton McNeill, who has been serving as chief dispatcher at Decatur for the past six years.

W. R. MCGOVERN, who became connected with the Wisconsin Telephone Co. 19 years ago as a draftsman, has been appointed general manager of the company to succeed H. O. Seymour, resigned. Mr. McGovern, after handling construction, equipment, traffic and other branches of work for the local company, was appointed engineer in 1907. In 1911 he was sent to Chicago as chief engineer of the Chicago Telephone Co. and is now chief engineer of the central group of Bell telephone companies, with headquarters at Chicago. He holds a degree from Marquette university, is a fellow member of the American Institute of Electrical Engineers and is a member of the American Association for the Advancement of Science.

PERCY C. FRISBIE, the new assistant superintendent of the transportation department of the Edison Electric Illuminating Co., Boston, Mass., was born in Charlestown, Mass., on July 3, 1875. He entered the employ of the Boston Edison Co. on March 16, 1897, as clerk in the inspection division of the construction department and was later transferred to the office division, which was under the charge of C. H. Hodskinson, and whom he later succeeded as chief clerk. After serving in this capacity for some time, Mr. Frisbie became connected with the installation department. In August, 1905, he was appointed superintendent of the general service department. He held this position less than two years, when he decided that he would take up work in new fields, and on April 17, 1907, tendered his resignation. In September of the same year he returned to the company as chief clerk of the transportation department and on Dec. 1, 1918, was promoted to the position of assistant superintendent of the department.

F. D. NIMS, vice-president and general manager of the Washington Coast Utilities, Seattle, Wash., recently returned after a trip of six weeks to Chicago, Boston and New York.

L. P. PROSSEN has resigned as mechanical superintendent of the Black & White Taxicab Co., New York City, to become associated with the Nilson-Miller Co., engineer and machinist, of Hoboken, N. J. Mr. Prossen has been elected vice-president and will be in charge of the gear cutting, piston and piston ring departments.

JOHN H. MILLER, who for the past year has been a lieutenant serving in the Signal Corps at Washington, D. C. in the radio development department, has received his release and become associated with the Jewell Electrical Instrument Co., Chicago, in charge of the engineering department. After his graduation from the University of Illinois, Mr. Miller entered the employ of the Westinghouse Electric & Manufacturing Co., serving in the detail and supply department of the company for several years before he engaged in Government service.

WILLIAM D. DYER, who for some time has served the Edison Electric Illuminating Co., Boston, Mass., in the department of collections, was recently appointed assistant superintendent of the department. Mr. Dyer was born in Somerville, April 3, 1878. After completing his study at the Cambridge Grammar and Latin Schools, he attended Bryant and Stratton's Commercial School, and on May 31, 1899, became connected with the company as clerk in the Head Place office. He later left the company to take up other work and again joined the ranks of the Edison company in the bookkeeping department. Later he was transferred to the department of collections, where he has since been assisting Mr. Goss.

GEORGE L. WILKINS, commercial manager of the Wisconsin Public Service Co., Green Bay, Wis., has resigned to become affiliated with the Illinois Electric Co., of Chicago, as sales representative, effective Feb. 1. Mr. Wilkins became commercial manager of the Wisconsin company about two years ago and prior to that time was connected with the Sheboygan Gas Light Co. as commercial manager. He was promoted from Sheboygan to Green Bay, as both of the properties are operated by Clement C. Smith. Mr. Wilkins has been identified with war work in Green Bay as assistant federal food administrator of Brown county, and chairman of the threshing division of the food administration. When he assumes the new office, Mr. Wilkins will establish his residence in Milwaukee and will have as his territory the southern section of Wisconsin.

HUNTINGTON B. CROUSE, of the Crouse-Hinds Co., Syracuse, N. Y., who has been acting as County Food Administrator, has resigned.

JAMES F. HUTCHINGS, Rochester, N. Y., has been elected president of the Rochester Railway & Light Co., succeeding Horace E. Andrews, deceased.

H. E. NORTH, formerly connected with the Minneapolis General Electric Co., has been appointed manager of the contract department of the Oklahoma Gas & Electric Co., Oklahoma City, Okla.

CLARK E. DIEHL, Harrisburg, Pa., manager of the local branch of the Postal Telegraph Co., and city electrician for many years, has resigned his managerial duties to devote his entire time to municipal work. Mr. Clark is well known in the street-lighting field and has held a number of offices with the International Association of Municipal Electricians.

S. D. SPRONG, electrical engineer for the Edison Electric Illuminating Co., Brooklyn, N. Y., has been appointed chairman of the street-lighting committee of the Association of Edison Illuminating Companies and also a member of the committee on electricity distribution and use. Mr. Sprong was formerly chief electrical engineer of T. G. White & Co., Inc., resigning that position about seven years ago to become associated with the Brooklyn company in his present capacity. Prior to his connection with the White company, he was electrical engineer for the United Electric Light & Power Co., New York City, having previously been affiliated with the New York Edison Co. and the Public Service Corporation of New Jersey.

A. W. THOMPSON, Federal manager of the Baltimore & Ohio R. R. and associated lines east of Parkersburg and Pittsburgh, has resigned to become president of the Duquesne Light Co., Pittsburgh, and the Philadelphia Co., the public service company of that city. He was previously chief engineer of the Baltimore & Ohio, and in 1912 was made vice-president in charge of operation and later vice-president in charge of traffic and commercial development. He became Federal manager of the system last year. Mr. Thompson was graduated from Allegheny College in 1897 and in 1899 entered the service of the Baltimore & Ohio as assistant of surveys on the Pittsburgh system. A year later he was appointed division engineer of the Pittsburgh division. In 1903 he became superintendent of the Cumberland division and later of the Wheeling division. Four years later he was promoted to the position of chief engineer maintenance of way, becoming chief engineer three years later.

For the Reconstruction Period—What?

XXII.

Institutional Advertising

The man whose words carry the greatest weight is the man with a background. What he says may not be original or profound, but the fact that it was he who said it makes the difference.

If he has spent toilsome years in study and research, the fact entitles him to be heard with respect. If he has come up from poverty and obscurity to distinction, his words command instant attention. If he has lived a varied, useful, resourceful life, he will be sure of an audience.

Study, service, experience, achievement are the open sesame to the best which the world has to offer in the way of preferment and reward.

What is true of the individual also applies in a very literal sense to the corporation. As an institution, with a background of achievement, of growth and of service, it is entitled to make its claims heard. But proper recognition of itself and its products will only be given when it has shown on what they rest. That is "institutional advertising."

THERE never was a time when it paid better to let the world know the plant, the organization, the experience which lie back of your product. To bring these facts out clearly is a service of real value to your customers and to yourself.

C. A. TUPPER CHICAGO
President INTERNATIONAL TRADE PRESS, Inc.

Financial News

Kellogg Switchboard & Supply Co. Makes Report.

Stockholders of the Kellogg Switchboard & Supply Co. have been informed that net billings of the company for the year 1918 amounted to $5,900,000, as compared to $5,200,000 in the previous year. No figures as to net earnings were available as accountants have not finished an audit of the year's business or the taking of inventory.

Unfilled orders are within $50,000 of the business on the company's books a year ago. Quick assets amount to more than $1,500,000, while current liabilities amount to only $53,000, including current pay roll. The company and its employes subscribed to $1,033,000 of Liberty Bonds of various issues, of which the company holds $370,000.

Seymour Guthrie, secretary, in a preliminary report, said that the telephone business of the company showed contraction and would remain in uncertainty until government policy is fixed, but he expressed the assurance that large business must be expected from the companies eventually. Since the removal of restrictions on the manufacture of automobiles the company's activities in the making of accessories has increased markedly.

Bond Issues of Illinois Utilities Authorized.

The Illinois Public Utilities Commission has received and acted upon a large number of petitions the past fortnight, most of which relate to the financial operations of various electric utility companies of the state. The Jacksonville Railway & Light Co. was given authority to issue $183,000 first mortgage 5% gold bonds. The Illinois Central Traction Co., a subsidiary of the Illinois Traction Co., was granted authority to issue 6% cumulative preferred capital stock in the amount of $245,000. This company was also allowed to issue $254,000 general mortgage 6% gold bonds. The Chicago, Ottawa & Peoria Railway Co., also a subsidiary of the Illinois Traction System, was given permission to issue $576,000 first consolidated and refunding mortgage 5% gold bonds. The Northern Illinois Light & Traction Co. was granted permission to issue $90,000 general mortgage 6% gold bonds. The application of the East St. Louis Railway Co. to increase rates for street railway service in East St. Louis was suspended until July 30, 1919.

Annual Report of Milwaukee Building and Loan Association.

The annual meeting of the Employes Mutual Savings Building and Loan Association of the Milwaukee Electric Railway & Light Company brought out some interesting facts and figures. The annual report submitted at this meeting showed assets of $836,938, an increase of 48% over the previous year. The capital stock is $5.000,000, of which $3,739,400 is issued. The organization has a subscription list of 2250 names and makes loans only to employes of the company. During the five years of its existence it has grown to be one of the largest building and loan associations in the state of Wisconsin, inasmuch as the last two years of these five years when our nation was at war and most of the five years were included in the total period of war conditions abroad, with increasing costs of living, the showing of this building and loan association is indeed remarkable. All officers and directors were re-elected at the annual meeting.

Citizens of Spokane, Wash., have purchased $2,000,000 of the $3,000,000 note issues of Washington Water Power Co., for refunding notes of about similar amount issued a year ago. It is stated that another issue of $800,000 may be offered later to raise funds for making improvements at the company's Long Lake hydroelectric plant, where an additional 16,500-hp. unit is required to supply the power to be required by the C. M. & St. Paul Railway Co. on its Othello-Tacoma electrification.

Springfield Company to Issue Bonds.

The Springfield Consolidated Railway Co., Springfield, Ill., has been authorized to issue capital stock to the amount of $79,500 by the Illinois Public Utilities Commission. The company was also authorized in the same order to issue $107,000 of 5% gold bonds maturing in 35 years and secured by a mortgage to the Fidelity & Columbia Trust Co., and L. N. Bender, trustee, of Louisville, Ky., under date of June 1, 1913.

Dividends.

Montreal Light, Heat & Power Co. has declared a quarterly dividend of 1%, payable Feb. 15 to stock of record Jan. 31.

Texas Power & Light Co. has declared a dividend of 1¾%, payable Feb. 10 to stock of record Jan. 30.

Carolina Light & Power Co. has declared a quarterly dividend of ½%, payable Feb. 1 to stock of record Jan. 15.

Railway & Light Securities Co. has declared a semi-annual dividend of 3%, also a semi-annual dividend of 3% on preferred stock, both payable Feb. 1 to stock of record Jan. 15.

Pacific Gas & Electric Co. has declared a quarterly dividend of $1 50 on preferred stock, also a dividend of $1.50 on first preferred stock, payable Feb. 15 to stock of record Jan. 31.

The Attica Light & Power Co., Attica, Ind., has filed a petition with the Indiana Public Service Commission asking for authority to borrow $15,000 from local banks. The funds will be used for improvements to the plant of the company.

Earnings.

INTERBOROUGH RAPID TRANSIT.

For November—	1918.	1917.
Gross	$ 3,435,687	$ 3,454,687
Net after taxes	1,090,619	1,554,618
Total income	1,776,667	1,782,300
Surplus after charges	239,822	685,035
For the 5 months ended Nov. 30—		
Gross	$16,170,935	$15,928,087
Net after taxes	4,730,496	6,009,407
Total income	7,670,446	8,145,851
Surplus after charges	493,963	2,765,798

UNITED LIGHT & RAILWAYS CO.

Comparative consolidated earnings statement for 12 months ended Nov. 30:

	1918.	1917.
Gross earnings, all sources	$9,161,197	$7,563,147
Net after all taxes	2,675,731	2,782,302
Balance after interest, etc.	979,789	1,187,408
Dividends on preferred stock	607,656	604,941
Balance	372,133	582,467

WESTERN UNION TELEGRAPH.

Reports to the Interstate Commerce Commission for August, September and October and the period from Jan. 1, 1918, to Oct. 20, 1918:

For August—	
Operating revenue	$ 7,403,000
Net operating revenue	1,216,000
Operating income	898,000
For September—	
Operating revenue	7,352,000
Net operating revenue	1,344,000
Operating income	996,000
For October—	
Operating revenue	8,202,000
Net operating revenue	1,989,000
Operating income	1,545,000
From Jan. 1, 1918, to Oct. 31, 1918—	
Operating revenue	71,782,000
Net operating revenue	15,456,000
Operating income	12,149,000

WEEKLY COMPARISONS OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Jan. 21.	Bid Jan. 28.
Adirondack Electric Power of Glens Falls, common	6	11	11
Adirondack Electric Power of Glens Falls, preferred	6	68	69
American Gas & Electric of New York, common	10+extra	100	98
American Gas & Electric of New York, preferred	6	43	43
American Light & Traction of New York, common	..	235	234
American Light & Traction of New York, preferred	6	98	98
American Power & Light of New York, common	4	56	55
American Power & Light of New York, preferred	6	75	75
American Public Utilities of Grand Rapids, common	..	..	..
American Public Utilities of Grand Rapids, preferred	7	35	35
American Telephone & Telegraph of New York	..	100	100½
American Water Works & Elec. of New York, common	..	4	4
American Water Works & Elec. of New York, particip.	7	10	10
American Water Works & Elec. of New York, first preferred	..	65	65
Appalachian Power, common	..	2	2
Appalachian Power, preferred	7	12	12
Cities Service of New York, common	+extra	285	296
Cities Service of New York, preferred	6	76½	79½
Commonwealth Edison of Chicago	8	114½	114
Comm. Power, Railway & Light of Jackson, common	..	20	19
Comm. Power, Railway & Light of Jackson, preferred	6	40	41
Federal Light & Traction of New York, common	..	8	8
Federal Light & Traction of New York, preferred	..	39	39
Illinois Northern Utilities of Dixon	6	..	..
Middle West Utilities of Chicago, common	2+extra	20	20
Middle West Utilities of Chicago, preferred	6	50	50
Northern States Power of Chicago, common	..	57	62
Northern States Power of Chicago, preferred	ex.div.7	87	89
Pacific Gas & Electric of San Francisco, common	..	47	47
Pacific Gas & Electric of San Francisco, preferred	6	85	85
Public Service of Northern Illinois, Chicago, common	7	90	90
Public Service of Northern Illinois, Chicago, preferred	6	90	90
Republic Railway & Light of Youngstown, common	4	16	17
Republic Railway & Light of Youngstown, preferred	6	50	51
Standard Gas & Electric of Chicago, common	..	13	13
Standard Gas & Electric of Chicago, preferred	6	31	31
Tennessee Railway, Light & Power of Chattanooga, common	..	2½	2
Tennessee Railway, Light & Power of Chattanooga, preferred	6	13	13
United Light & Railways of Grand Rapids, common	4	37	37
United Light & Railways of Grand Rapids, preferred	6	70	70
Western Power of San Francisco, common	..	17½	17½
Western Union Telegraph of New York	extra	87	86¼
Industrials—			
Electric Storage of Philadelphia, common	4	53	52½
General Electric of Schenectady	8	147	148
Westinghouse Electric & Mfg. of Pittsburgh, common	7	41	41
Westinghouse Electric & Mfg. of Pittsburgh, preferred	7	55	55